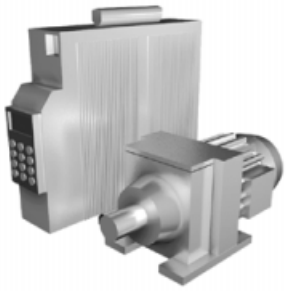
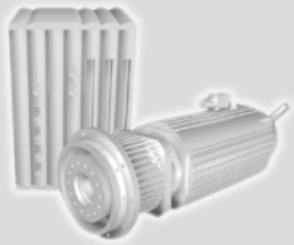
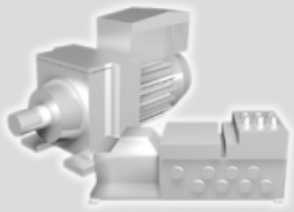
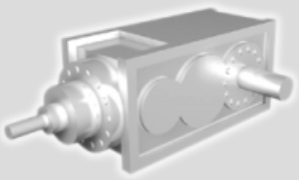
SEW EURODRIVE





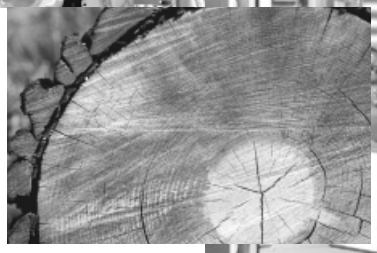




AC Motors DRS/DRE/DRP

Edition 05/2007
11606215 / EN

Operating Instructions



SEW
EURODRIVE

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1 General Information

1.1 Structure of the safety notes

The safety notes in these operating instructions are structured as follows:

Symbol	SIGNAL WORD
	Nature and source of hazard Possible consequence(s) if disregarded. • Measure(s) to avoid the hazard.

Symbol	Signal word	Meaning	Consequences if disregarded
Example: General hazard Specific danger, e.g. electric shock	**DANGER**	Imminent danger	Severe or fatal injuries
	WARNING	Possible dangerous situation	Severe or fatal injuries
	CAUTION	Possible dangerous situation	Minor injuries
	STOP	Possible damage to property	Damage to the drive system or its environment
	NOTE	Useful information or tip. Simplifies the handling of the drive system.	

1.2 Rights to claim under warranty

Adhering to the operating instructions is a prerequisite for fault-free operation and the fulfillment of any right to claim under warranty. Read the operating instructions before you start working with the unit.

Make sure that the operating instructions are available to persons responsible for the system and its operation, as well as to persons who work independently on the unit. You must also ensure that the documentation is legible.

1.3 Exclusion of liability

You must comply with the information contained in these operating instructions to ensure safe operation of the electric motors and to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

2 Safety Notes

The following basic safety notes are intended to prevent injury to persons and damage to property. The operator must make sure that the basic safety notes are read and observed. Make sure that the persons responsible for the plant and its operation, as well as those who work independently on the unit, have read through the operating instructions carefully and understood them. If you are unclear about any of the information in this documentation, please contact SEW-EURODRIVE.

2.1 Preliminary information

The following safety notes relate primarily to the use of motors. If using gearmotors, please also refer to the safety notes for gear units in the corresponding operating instructions.

Also consider the supplementary safety notes in the individual sections of these operating instructions.

2.2 General

Never install or operate damaged products. In the event of damage, submit a complaint to the shipping company immediately.

Low-voltage machines have dangerous, live and rotating parts as well as hot surfaces.

All work related to transportation, storage, setup/mounting, connection, startup, maintenance and repair may only be carried out by qualified personnel, in strict observation of:

- The relevant detailed operating instruction(s) and wiring diagrams
- The warning and safety signs on the motor/gearmotor
- The specific regulations and requirements for the system
- The national/regional regulations governing safety and the prevention of accidents

Removing covers without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to machinery.

Consult the documentation for additional information.

2.3 Designated use

The electric motors are intended for industrial systems. Use in potentially explosive areas is prohibited, unless measures are expressly taken to make it possible.

Air-cooled versions are designed for ambient temperatures of –20 °C (–4 °F) to +40 °C (104 °F) and installation altitudes ≤ 1000 m (3281 ft) above sea level. Note that information on the nameplate may differ. It is essential that the operating conditions for the unit comply with the nameplate information.

2.4 Transportation

Immediately upon receipt, inspect the shipment for any damage that may have occurred during transportation. If necessary, inform the shipping company immediately. You may need to preclude startup.

Tighten the eyebolts securely. They are only intended for the weight of the motor/gearmotor; do not attach any additional loads.

The built-in lifting eyebolts comply with DIN 580. Always observe the loads and regulations listed in this standard. If the gearmotor is equipped with two eyebolts, then both of these should be used for transportation. In this case, the tension force vector of the slings must not exceed a 45° angle according to DIN 580.

Use suitable, sufficiently rated handling equipment when necessary. Remove any transportation fixings prior to startup. Reattach these in the case of further transportation. If low-voltage machines are put into storage, make sure they are kept in a dry, dust-free and low-vibration (v_{eff} ≤ 0.2 mm/s) environment (bearing standstill damage). Measure the insulation resistance prior to startup. Dry the winding if values ≤ 1 kΩ per volt of the rated voltage.

2.5 Installation

Make sure that the supports are even, the foot and flange mounting is correct and if there is direct coupling, align with precision. Resonances between the rotational frequency and the double network frequency caused by the structure are to be avoided. Turn the rotor manually and listen for unusual noises. Check the direction of rotation in decoupled status.

Only install or remove belt pulleys and couplings using suitable devices (heat up) and cover with a touch guard. Avoid improper belt tension.

Make the pipe connections that may eventually be required. Mounting positions with shaft ends pointing upwards should be equipped with a cover to prevent foreign objects from falling into the fan. Ensure that ventilation openings are not obstructed and that used air, including air from adjacent units, cannot be drawn in again straight away.

Observe the notes in the "Mechanical Installation" section.

2.6 Electrical connection

All work may only be carried out by qualified personnel. During work, the low-voltage machine must be on standstill, enabled, and safeguarded against an accidental restart. This also applies to auxiliary circuits (e.g. anti-condensation heating).

Check that the motor is de-energized.

Exceeding the tolerances in EN 60034-1 (VDE 0530, part 1) – voltage +5%, frequency +2%, curve shape, symmetry – increases the heating and influences electromagnetic compatibility. Observe nameplate data and the wiring diagram in the terminal box.

Pay attention to the wiring information and different data on the nameplate, as well as observing the wiring diagram.

The connection should be a continuous secure electrical connection (no protruding wire ends); use the cable end equipment intended for this purpose. Establish a secure protective earth connection. When the motor is connected, the distances to non-insulated and live parts must not be shorter than the minimum values according to IEC 60664 and national regulations. With low voltage, the distances should be no shorter than the following values, in compliance with IEC 60664:

Rated voltage V_N	Distance
≤ 500 V	3 mm
≤ 690 V	5.5 mm

The terminal box must be free of foreign objects, dirt and humidity. Unused cable entry openings and the box itself must be closed so that they are dust and water proof. Secure keys for test mode without output elements. When operating low-voltage machines with brakes, check that the break is functioning correctly before startup.

Observe the notes in the "Electrical Installation" section.

2.7 Operation

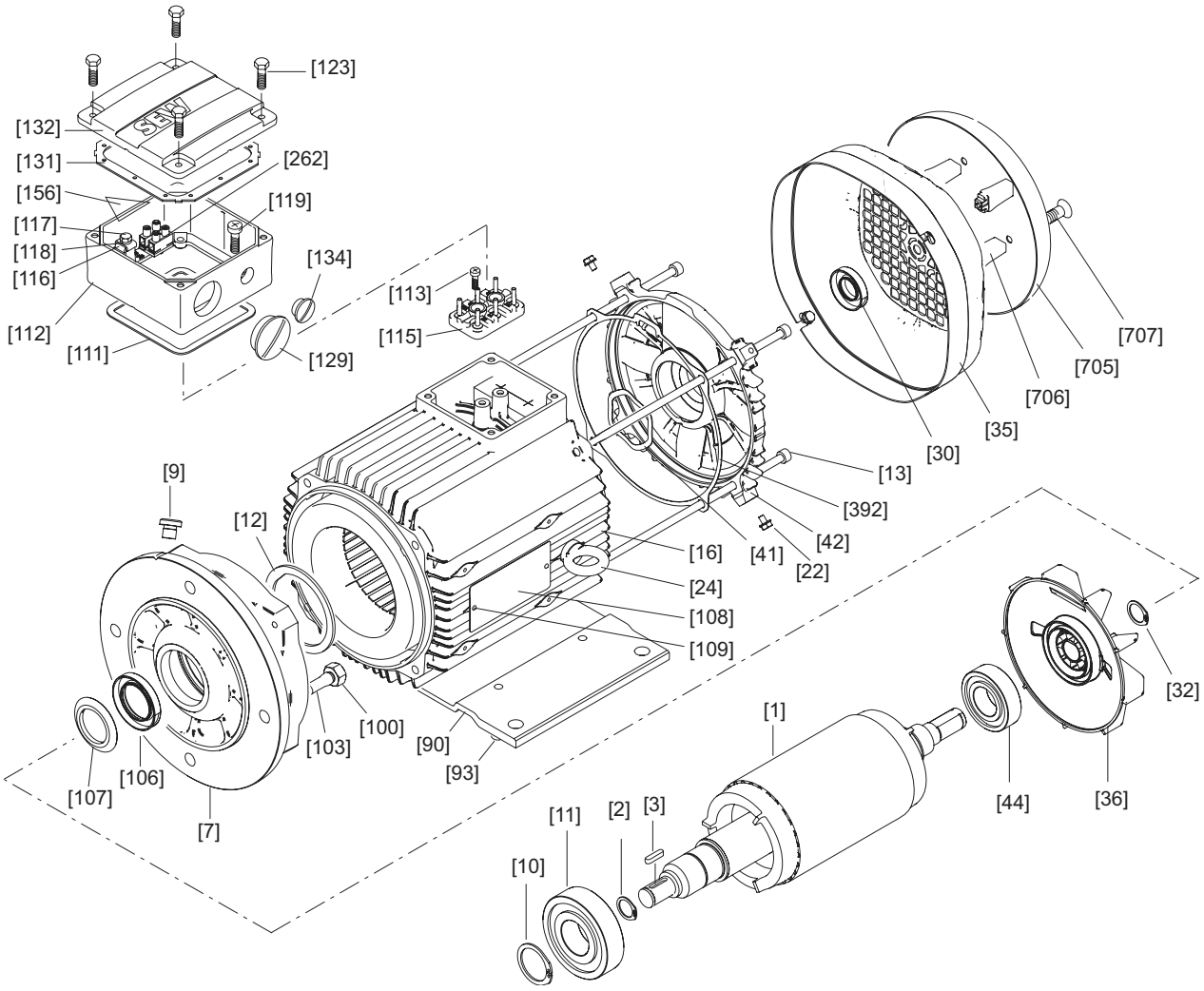
Whenever changes to normal operation occur, such as increased temperatures, noise, vibrations, etc., you should determine the cause and contact the manufacturer, if required. Never deactivate protection devices, even in test mode. If you are in doubt, switch off the motor.

Regularly clean air ducts in dusty or dirty environments.

3 Motor Design

	NOTE
	The following illustration shows the general structure. Its only purpose is to facilitate the assignment of components to the spare parts lists. Deviations are possible depending on the motor size and version.

3.1 Basic structure of DR71 – DR100



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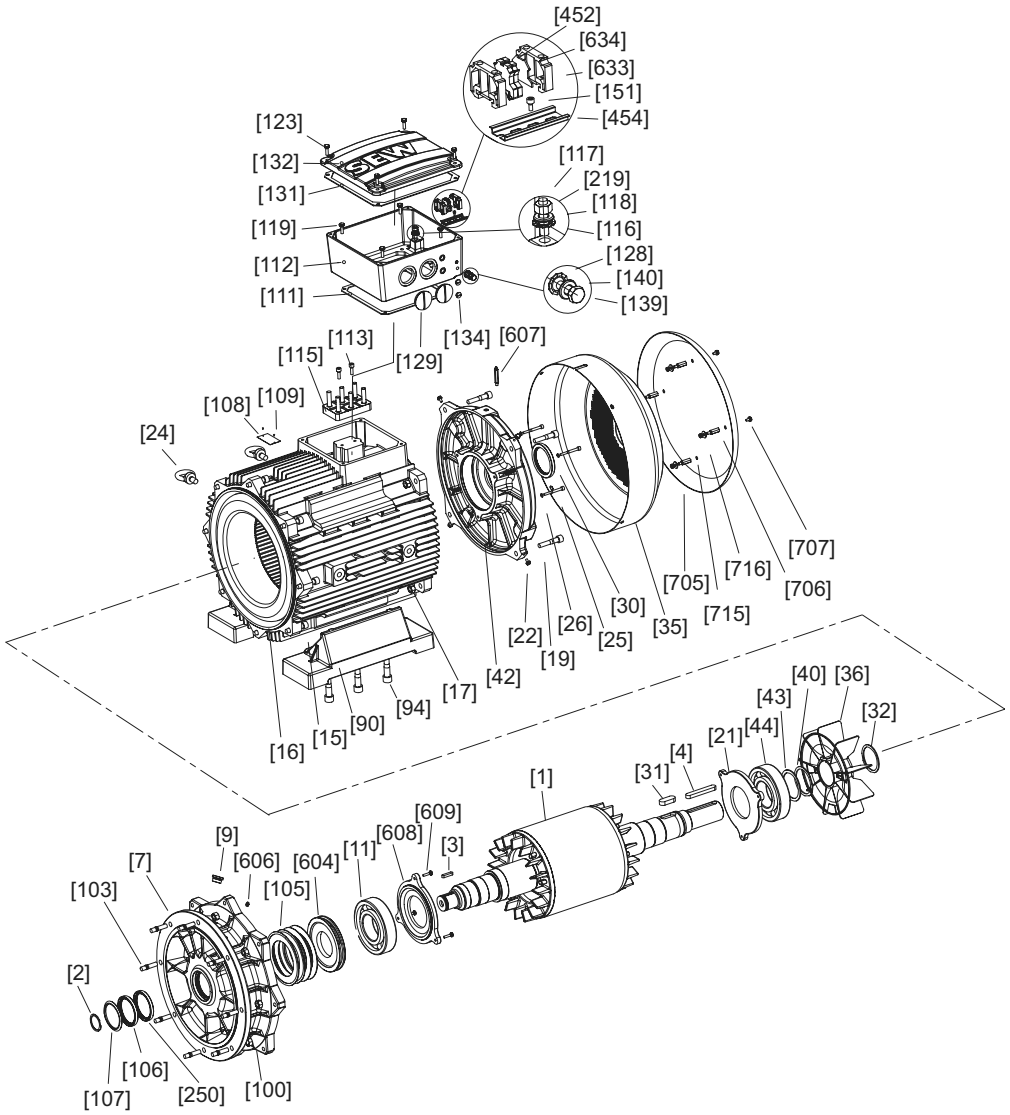
[1] Rotor
[2] Circlip
[3] Key
[7] Flanged endshield
[9] Screw plug
[10] Circlip
[11] Deep groove ball bearing
[12] Circlip
[13] Machine screw
[16] Stator
[22] Hex head bolt
[24] Eyebolt
[30] Oil seal
[32] Circlip
[35] Fan guard
[36] Fan
[41] Shim washer
[42] B-side endshield
[44] Deep groove ball bearing
[90] Base plate
[93] Pan head screw
[100] Hex nut
[103] Stud
[106] Oil seal
[107] Oil flinger
[108] Nameplate
[109] Grooved pin
[111] Gasket for lower part
[112] Terminal box lower part
[113] Pan head screw
[115] Terminal board
[116] Terminal clip
[117] Hex head bolt
[118] Lock washer
[119] Pan head screw
[123] Hex head bolt
[129] Screw plug with O-ring
[131] Gasket for cover
[132] Terminal box cover
[134] Screw plug with O-ring
[156] Information sign
[262] Terminal clip, complete
[392] Gasket
[705] Protective cowl
[706] Spacer
[707] Pan head screw

3.2 Basic structure DR315



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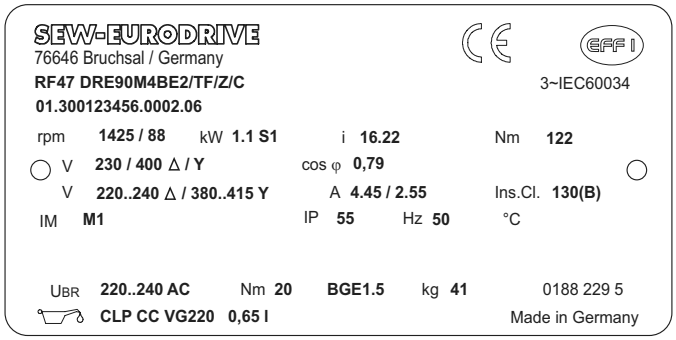
[1] Rotor
[2] Circlip
[3] Key
[4] Key
[7] Flange
[9] Screw plug
[11] Roller bearing
[15] Machine screw
[16] Stator
[17] Hex nut
[19] Machine screw
[21] Oil seal flange
[22] Hex head bolt
[24] Eyebolt
[25] Machine screw
[26] Sealing washer
[30] Oil seal
[31] Key
[32] Circlip
[35] Fan guard
[36] Fan
[40] Circlip
[42] B-side endshield
[43] Supporting ring
[44] Roller bearing
[90] Foot mounting
[94] Machine screw
[100] Hex nut
[103] Stud
[105] Cup spring
[106] Oil seal
[107] Oil flinger
[108] Nameplate
[109] Grooved pin
[111] Gasket for lower part
[112] Terminal box lower part
[113] Machine screw
[115] Terminal board
[116] Serrated lock washer
[117] Stud
[118] Washer
[119] Hex head bolt
[123] Hex head bolt
[128] Serrated lock washer
[129] Screw plug
[131] Gasket for cover
[132] Terminal box cover
[134] Screw plug
[139] Hex head bolt
[140] Washer
[151] Machine screw
[219] Hex nut
[250] Oil seal
[452] Terminal strip
[454] Top hat rail
[604] Lubrication ring
[606] Greasing nipple
[607] Greasing nipple
[608] Oil seal flange
[609] Hex head bolt
[633] End bracket
[634] End plate
[705] Protective cowl
[706] Spacer bolt
[707] Hex head bolt
[715] Hex nut
[716] Washer

3.3 Nameplate, unit designation

3.3.1 Nameplate

Example:
DRE gearmotor with brake



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3.3.2 Unit designation

Example:
Foot-mounted AC motor with brake

DRE 90 M4 BE2 /FI /TF /ES7S

- Motor option sinusoidal encoder ES7S
- Motor option thermal motor protection with thermistor TF
- IEC foot-mounted motor version
- Motor with brake BE2
- Motor length and number of poles
- Motor size
- DR motor series with code letter E type CEMEP EFF1 energy efficient motor or MEPS A2

4 Mechanical Installation

	NOTE
	It is imperative that you observe the safety notes in section 2 during installation.

4.1 Before you begin

The drive may only be installed if:

- the specifications on the drive's nameplate and the output voltage of the frequency inverter match the voltage supply system
- the drive is undamaged (no damage caused by transportation or storage)
- it is certain that the following requirements have been fulfilled:
  - ambient temperature between –20 °C (–4.0 °F) and 40 °C (104 °F) [1)]
  - no oil, acid, gas, vapors, radiation, etc.
  - installation altitude max. 1000 m (3281 ft) above sea level
  - note the limitations for encoders
  - special versions: drive configured in accordance with the ambient conditions.

STOP	**STOP**
	The mounting position for installation must correspond to the specifications on the nameplate.

4.2 Mechanical Installation

4.2.1 Preliminary work

Motor shaft ends must be thoroughly cleaned of anti-corrosion agents, contamination or similar (use a commercially available solvent). Do not allow the solvent to penetrate the bearings or sealing rings – this could cause material damage.

Motors with reinforced bearings

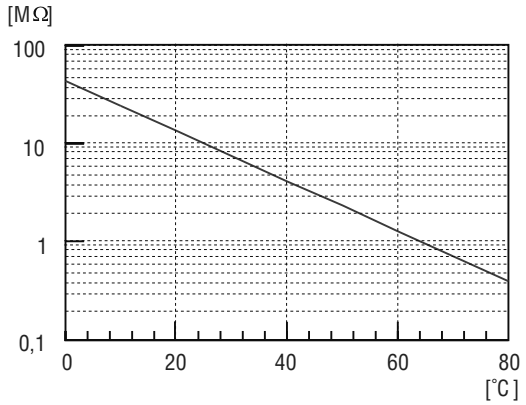
STOP	**STOP**
	Motors with a reinforced bearing must not be operated without an overhung load. Otherwise you risk damaging the bearings.

1) Note that you can also limit the temperature range of the gear unit (see gear unit operating instructions).

Extended storage of motors

- Note that the service life of the lubricant in the ball bearings is reduced by 10% per year after the first year of storage.
- You should re-lubricate the lubrication devices on motors that have been in storage for longer than 5 years before startup. Observe the information on the motor lubricant plate.
- Check whether the motor has absorbed moisture as a result of being stored for a long time. To do so, measure the insulation resistance (measuring voltage 500 V).

The insulation resistance (see following figure) varies greatly depending on the temperature. The motor must be dried if the insulation resistance is not adequate.



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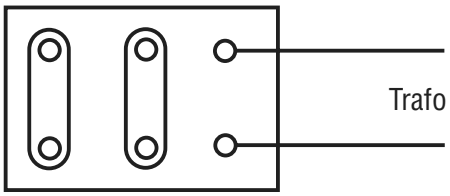
Drying the motor

Heat the motor:

- with hot air or
- using an isolation transformer
  - connect the windings in series (see following figure)
  - auxiliary AC voltage supply max. 10 % of the rated voltage with max. 20 % of the rated current



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The drying process is finished when the minimum insulation resistance has been exceeded.

In the terminal box check that:

- the inside is clean and dry
- the connections and fixing parts are free from corrosion
- the gasket and sealing surfaces are functioning
- the cable glands are sealed; if they are not, clean or replace them

4.2.2 Installing the motor

The motor or gearmotor may only be mounted or installed in the specified mounting position on a level, vibration-proof and torsionally rigid support structure.

Carefully align the motor and the driven machine to avoid placing any intolerable strain on the output shafts (observe permitted overhung load and axial load).

Do not butt or hammer the shaft end.

Use an appropriate cover to prevent objects or fluids entering motors in vertical mounting positions (protective cowl C).

Ensure the cooling air supply is unobstructed and that air heated by other apparatus cannot be drawn in again.

Balance components for subsequent mounting on the shaft with a half key (motor shafts are balanced with a half key).

Condensation drainage holes are plugged with closing plugs. These can be opened if you want to drain the condensation but must be closed again, as open drain holes render higher enclosures void.

If using brake motors with manual brake release, screw in either the hand lever (with self-reengaging manual brake release) or the setscrew (with lockable manual brake release).

Installation in damp locations or in the open

If possible, arrange the terminal box so that the cable entries are pointing downwards.

Coat the threads of cable glands and filler plugs with sealing compound and tighten them well; then coat them again.

Seal the cable entry well.

Thoroughly clean the sealing surfaces of terminal boxes and terminal box covers prior to reassembly; gaskets must be glued in on one side. Replace brittle gaskets.

Restore the anticorrosive coating if necessary.

Check the enclosure.

4.2.3 Installation tolerances

Shaft end	Flanges
Diameter tolerance according to EN 50347 • ISO j6 at Ø ≤ 28 mm (1.1 in) • ISO k6 at ∅ ≥ 38 mm (1.5 in) to ≤ 48 mm (1.9 in) • ISO m6 at ∅ ≥ 55 mm (2.2 in) • Center hole in accordance with DIN 332, shape DR.	Centering shoulder tolerance in accordance with EN 50347 • ISO j6 at Ø ≤ 250 mm (9.84 in) • ISO h6 at Ø ≥ 300 mm (11.8 in)

5 Electrical Installation

	NOTE
	• It is imperative that you observe the safety notes in section 2 during installation. • Use switch contacts in utilization category AC-3 according to EN 60947-4-1 for switching the motor and the brake.

5.1 Use wiring diagrams

Connect the motor only as shown in the wiring diagram(s) included with the motor. **Do not connect or start up the motor if the wiring diagram is missing.** You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

5.2 Wiring notes

Comply with the safety notes during installation.

5.2.1 Protection against interference from brake controls

Unless they are shielded, brake cables must always be routed separately from other power cables with phased currents to protect brake controls against interference. In particular, power cables with phased currents include:

- output cables from frequency inverters and servo controllers, soft startup units and brake units
- supply cables for braking resistors and similar options

5.2.2 Protecting against interference by motor protection devices

To protect against interference by SEW motor protection devices (temperature sensors TF, winding thermostats TH):

- Route separately shielded supply cables together with switched-mode power lines in one cable.
- Do not route unshielded supply cables together with switched-mode power lines in one cable.

5.3 Special features when operating with a frequency inverter

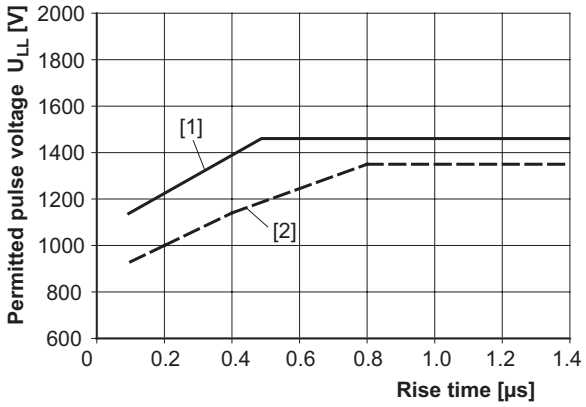
When motors are powered by inverters, you must adhere to the relevant wiring notes issued by the inverter manufacturer. You must also observe the operating instructions for the frequency inverter.

5.3.1 Motor on SEW inverter

SEW-EURODRIVE has tested operation of the motor on SEW frequency inverters. The required dielectric strength values of the motors were confirmed and the startup routines adjusted to the motor data. You can operate the DR motor with any frequency inverter from SEW-EURODRIVE. To do this, start up the motor as described in the operating instructions for the frequency inverter.

5.3.2 Motor on a non-SEW inverter

You may operate SEW motors on non-SEW frequency inverters if the pulse voltages indicated in the figure below are not exceeded at the given rise times.



[1] Permitted pulse voltage for DR standard
[2] Permitted pulse voltage according to IEC 60 034-17

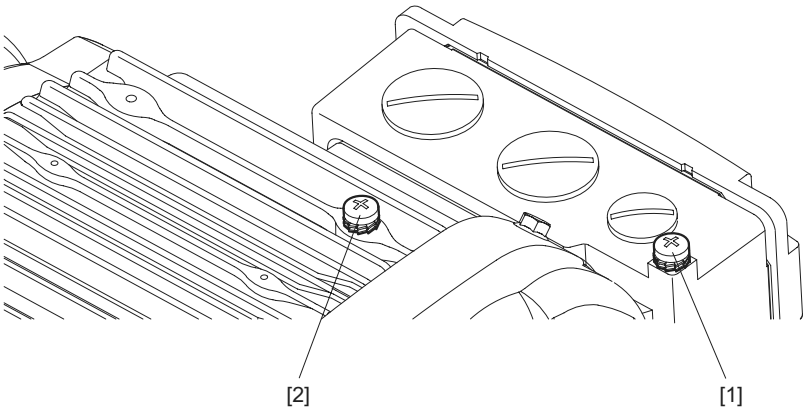
	NOTE
	The diagram applies to motor operation of the motor. If the permitted pulse voltage is exceeded, you must install limiting measures, such as filters, chokes or special motor cables. You should also consult the manufacturer of the frequency inverter.

5.4 Improving the grounding (EMC)

For improved, low-impedance grounding at high frequencies, we recommend using the following connections:

5.4.1 Size DR71...DR100:

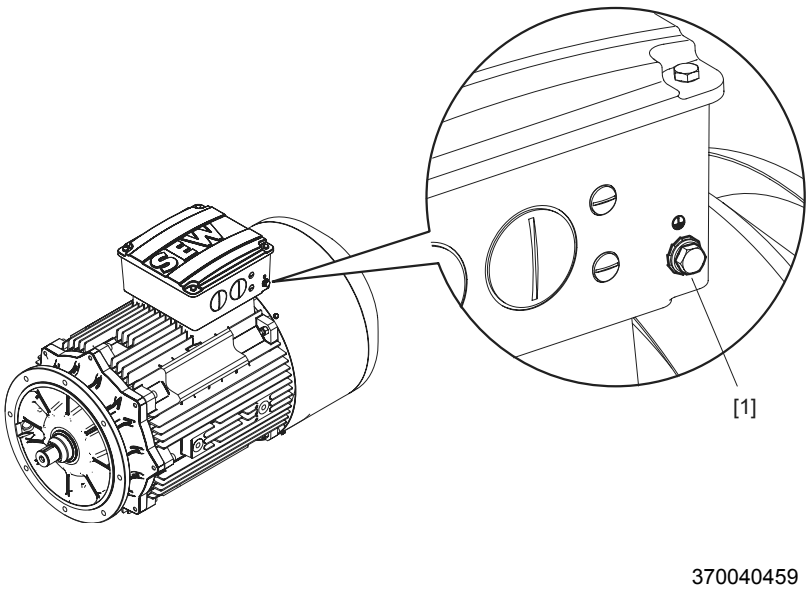
DIN 7500 M5 x 12 self-tapping screw and 2 serrated lock washers in accordance with DIN 6798.



[1] Use the pre-cast bore at the terminal box (brake motor)
[2] Bore in stator housing (∅ = 4.6 t_{max} = 11.5)

5.4.2 Size DR315:

- 1 x hex head bolt ISO 4017 M12 x 30
- 1 x washer ISO 7090
- 1 x serrated lock washer DIN 6798



[1] Use the grounding screw at the terminal box

5.5 Special features for switching operation

When the motors are used in switching operation, it is necessary to exclude possible interference of the switchgear using suitable wiring. According to EN 60204 (electrical equipment of machines), motor windings must have interference suppression to protect the numerical or programmable logic controllers. Since it is primarily switching operations that cause interference, SEW-EURODRIVE recommends installing protective circuits on the switching devices.

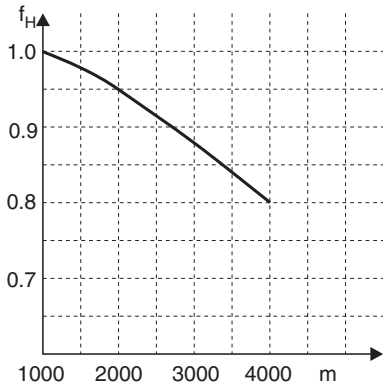
5.6 Ambient conditions during operation

5.6.1 Ambient temperature

Adherence to the temperature range of –20 °C (–4 °F) to +40 °C (104 °F) is imperative unless specified otherwise on the nameplate. Motors intended for use in higher or lower ambient temperatures will have the respective designation on the nameplate.

5.6.2 Installation altitude

The maximum installation altitude of 1000 m (3281 ft) above sea level must not be exceeded. Otherwise this causes a power reduction at a factor f_H as specified in the following diagram.



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The reduction in rated power is calculated according to the following formula:

$$P_{Rated1} = P_{Rated} \times f_H$$

P_{Rated1} = reduced rated power [kW]
P_{Rated} = rated power [kW]
f_H = factor for reduction due to installation altitude

5.6.3 Hazardous radiation

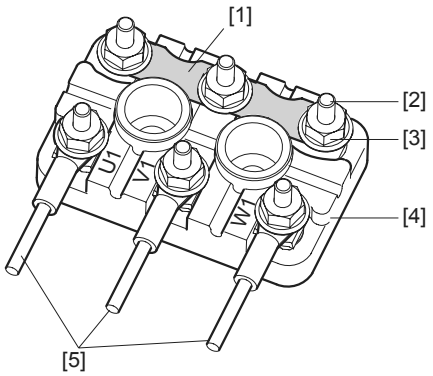
Motors must not be subjected to hazardous radiation (such as ionizing radiation). Contact SEW-EURODRIVE if necessary.

5.7 Connecting the motor

5.7.1 Connecting the motor via terminal boxes

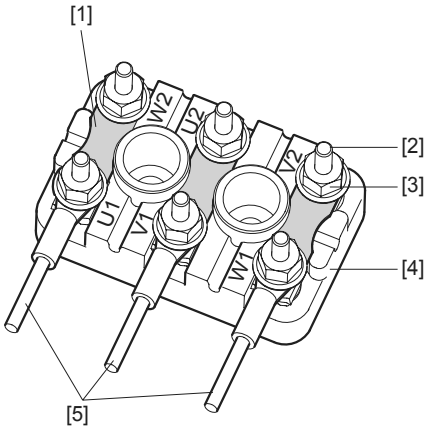
- in accordance with the wiring diagram provided
- check cable cross section
- arrange terminal links correctly
- firmly screw on connections and protective earth conductors
- In the terminal box: check winding connections and tighten them if necessary

Arrangement of terminal links with ⅄ connection

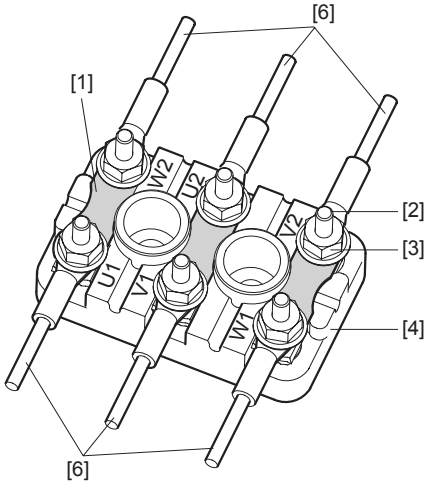


Arrangement of terminal links with △ connection

Motor size DR71-100:



Motor size DR315:



[1] Terminal link
[2] Terminal stud
[3] Flange nut
[4] Terminal board
[5] Customer connection
[6] Customer connection with divided connection cable

	NOTE
	The terminal box must be free of foreign objects, dirt and humidity. Unused cable entry openings and the terminal box itself must be closed so they are dust and water proof.

5.7.2 Motor connection terminal board

The motors are supplied and connected differently depending on the electrical design. Arrange the cables and terminal links as shown in the wiring diagram and screw them on firmly. Observe the tightening torques specified in the following tables.

Motor size DR71-100					
Terminal stud diameter	**Tightening torque of hex nut**	**Connection at customer end cross section**	**Version**	**Connection type**	**Scope of delivery**
M4	**1.6 Nm (14 in-lb)**	**≤ 1.5 mm²**	**Version 1a**	**Solid wire conductor end sleeve**	**Pre-assembled terminal links**
		≤ 6 mm²	**Version 1b**	**Ring cable lug**	**Pre-assembled terminal links**
		≤ 6 mm²	Version 2	Ring cable lug	Small connection accessories enclosed in bag
M5	2.0 Nm (18 in-lb)	≤ 10 mm²	Version 2	Ring cable lug	Small connection accessories enclosed in bag
M6	3.0 Nm (27 in-lb)	≤ 16 mm²	Version 3	Ring cable lug	Small connection accessories enclosed in bag

Motor size DR315					
Terminal stud diameter	**Tightening torque of hex nut**	**Connection at customer end cross section**	**Version**	**Connection type**	**Scope of delivery**
M12	**15.5 Nm (137 in-lb)**	≤ 50 mm²	**Version 3**	**Ring cable lug**	**Connection parts pre-assembled**
M16	**30 Nm (270 in-lb)**	≤ 95 mm²			

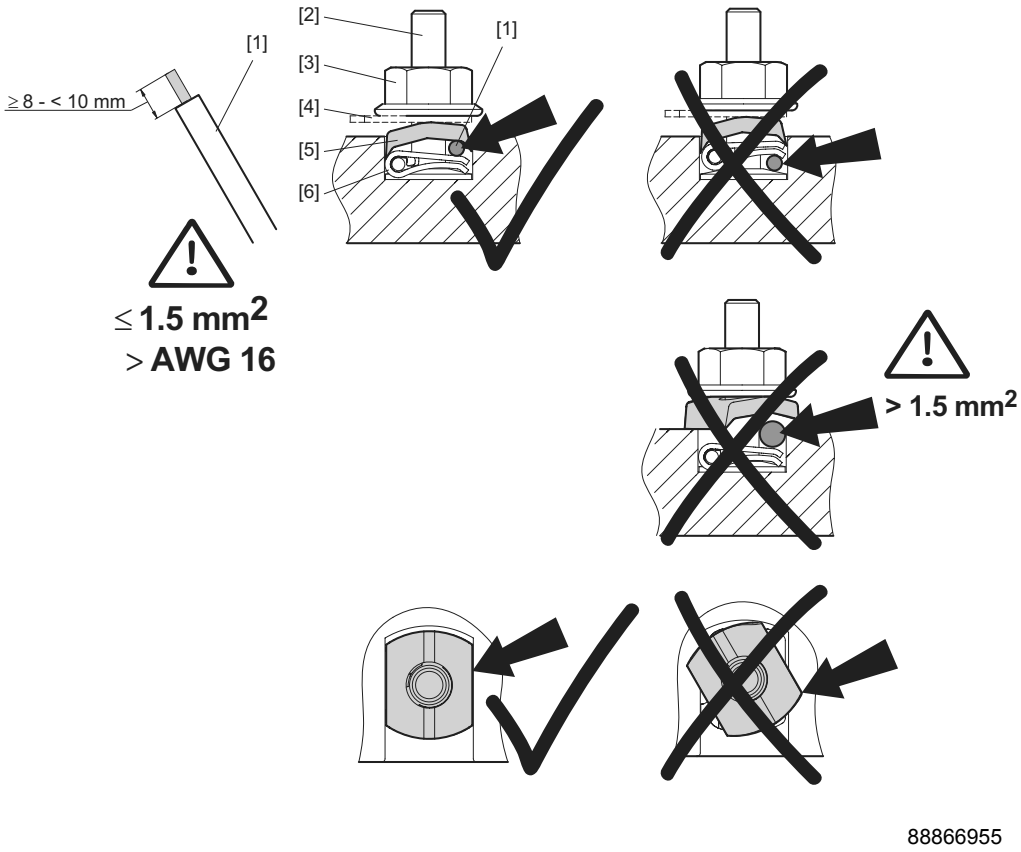
The versions in bold print apply to S1 operation for the standard voltages and standard frequencies according to the data in the catalog. Other versions may have different connections, for example different terminal stud diameters and/or a different scope of delivery.

Version 1

a) If the cross section of the external connection is ≤ **1.5 mm²**, it can be installed directly below the terminal washer.

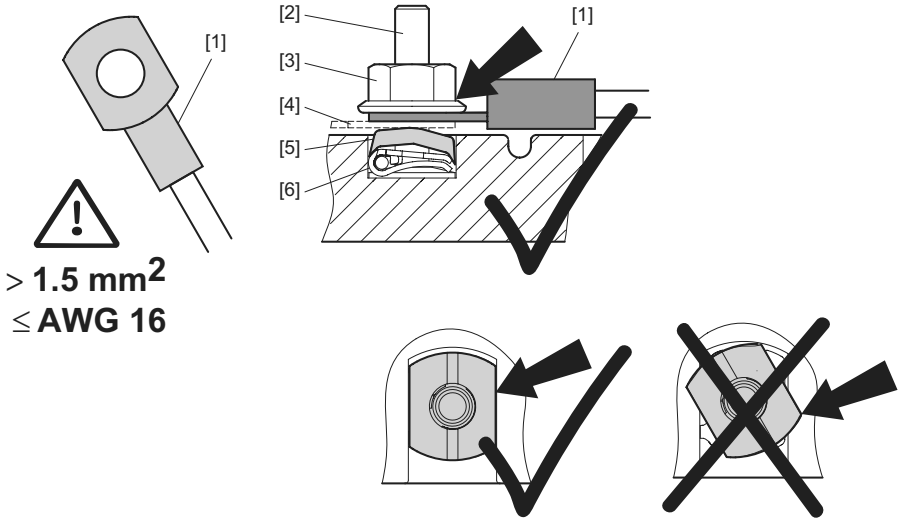
b) If the cross section of the external connection is **> 1.5 mm²**, it must be installed as a cable lug below the terminal washer.

Version 1a: cross section ≤ 1.5 mm²



[1] External connection with cross section ≤ 1.5 mm²
[2] Terminal stud
[3] Flange nut
[4] Terminal link
[5] Terminal washer
[6] Winding connection with Stocko connection terminal

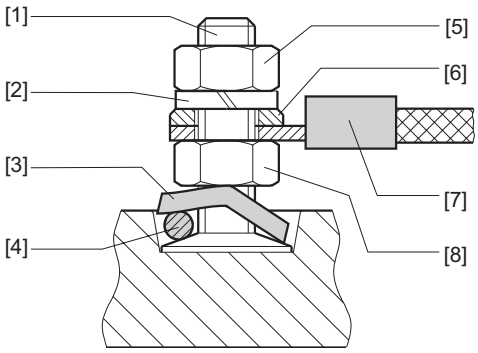
Version 1b: Cross section > 1.5 mm²



88864779

[1] External connection with ring cable lug, according to DIN 46237 or DIN 46234, for example
[2] Terminal stud
[3] Flange nut
[4] Terminal link
[5] Terminal washer
[6] Winding connection with Stocko connection terminal

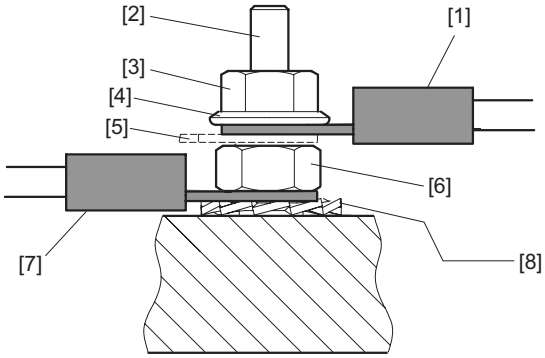
Version 2



185439371

[1] Terminal stud
[2] Lock washer
[3] Terminal washer
[4] Winding connection
[5] Top nut
[6] Washer
[7] External connection with ring cable lug, according to DIN 46237 or DIN 46234, for example
[8] Bottom nut

Version 3



199641099

[1] External connection with ring cable lug, according to DIN 46237 or DIN 46234, for example
[2] Terminal stud
[3] Top nut
[4] Washer
[5] Terminal link
[6] Bottom nut
[7] Winding connection with ring cable lug
[8] Serrated lock washer

5.8 Connecting the brake

The brake is released electrically. The brake is applied mechanically when the voltage is switched off.

	STOP
	• Comply with the applicable regulations issued by the relevant employer's liability insurance association for phase failure protection and the associated cycle times/cycle time modifications. • Connect the brake according to the wiring diagram provided. • In view of the DC voltage to be switched and the high level of current load, it is essential to use either special brake contactors or AC contactors with contacts in utilization category AC-3 according to EN 60947-4-1.

5.8.1 Connecting the brake control

The DC disc brake is powered by a brake control with protection circuit. This is accommodated in the terminal box / IS lower part or must be installed in the control cabinet.

- **Check the cable cross sections – braking currents (see Section "Technical Data")**
- Connect the brake control according to the wiring diagram provided
- For motors in thermal class 180 (H), install the brake rectifier in the control cabinet.

5.9 Accessory equipment

Connect accessory equipment as shown in the wiring connection diagram(s) provided with the motor. **Do not connect any accessory equipment if the wiring connection diagram is missing.** You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

5.9.1 Temperature sensor TF

	STOP
	The temperature sensor TF may not be subjected to voltages > 30 V.

The positive temperature coefficient (PTC) temperature sensors comply with DIN 44082.

Resistance measurement (measuring instrument with V ≤ 2.5 V or I < 1 mA):

- Standard measured values: 20...500 Ω, thermal resistance > 4000 Ω

When using the temperature sensor for thermal monitoring, the evaluation function must be activated to maintain reliable insulation of the temperature sensor circuit. If the temperature reaches an excessive level, the thermal protection function must be brought into effect immediately.

5.9.2 Winding thermostats TH

The thermostats are connected in series and open when the permitted winding temperature is exceeded. They can be switched in the drive monitoring circuit.

	AC V	DC V	
Voltage U [V]	250	60	24
Current (cos φ = 1.0) [A]	2.5	1.0	1.6
Current (cos φ = 0.6) [A]	1.6		
Contact resistance max. 1 Ohm at DC 5 V / 1 mA			

5.9.3 Forced cooling fan V

- Connection in separate terminal box
- Max. connection cross section 3 x 1.5 mm^2
- Cable gland M16 × 1.5

Operating mode / connection	Frequency in Hz	Voltage V
1 ~ AC (△)	50	230 – 277
1 ~ AC (△)	60	230 – 277
3 ~ AC 人	50	346 – 500
3 ~ AC 人	60	346 – 575
3 ~ AC △	50	200 – 290
3 ~ AC △	60	200 – 330

NOTE

For information on how to connect the forced cooling fan V, refer to the wiring diagram.

5.9.4 Overview of encoders

Refer to the wiring connection diagrams on information on how to connect incremental encoders:

Encoder	SEW motor	Encoder type	Mounting type	Power supply	Signal	Wiring diagram
ES7S	DR71-100	Encoder	Shaft-centered	DC 7..30 V	1 V_{ss} sin/cos	68 169 xx 06[1)]
ES7H	DR71-100	Encoder	Shaft-centered	DC 7..12 V	Hiperface single-turn	68 170 xx 06[1)]
AS7H	DR71-100	Encoder	Shaft-centered	DC 7..12 V	Hiperface multi-turn	68 170 xx 06[1)]
EH7S	DR315	Encoder	Shaft-centered	DC 10..30 V	1 V_{ss} sin/cos	08 259 xx 07[1)]
AH7Y	DR315	Encoder	Shaft-centered	DC 9..30 V	TTL + SSI (RS 422)	08 259 xx 07[1)]

1) xx = placeholder for the wiring diagram version

NOTE

- Maximum oscillation load for encoder ≤ 10 g ≈ 100 m/s^2 (3937.008 in/s^2) (10 Hz ... 2 kHz)
- Shock resistance ≤ 100 g ≈ 1000 m/s^2 for the DR71-100
- Shock resistance ≤ 200 g ≈ 2000 m/s^2 (78740.157 in/s^2) for the DR315

5.9.5 Encoder connection

When connecting encoders to inverters, always follow the operating instructions for the relevant inverter.

- Maximum cable length (inverter – encoder):
  - 100 m (328 ft) with a capacitance per unit length ≤ 120 nF/km (193 nF/mile)
- Core cross section: 0.20 ... 0.5 mm^2
- Use a shielded cable with twisted pair cores and apply shield over a large surface area at both ends:
  - to the connection cover of the encoder, in the cable gland, or in the encoder plug
  - to the inverter on the electronics shield clamp or to the housing of the sub D plug
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm (7.87 in).

6 Startup

6.1 Prerequisites for startup

	NOTE
	• It is essential to comply with Safety notes in section 2 (page 6) during installation. • In case of problems, refer to the "Malfunctions" section (page 81).

6.1.1 Before startup, make sure that

- the drive is undamaged and not blocked,
- the measures stipulated in section "Preliminary work" (page 12) are performed after extended storage period,
- all connections have been made properly,
- the direction of rotation of the motor/gearmotor is correct,
  - (motor rotating clockwise: U, V, W to L1, L2, L3)
- all protective covers have been installed correctly,
- all motor protection equipment is active and set for the rated motor current,
- and that there are no other sources of danger present.

6.1.2 During startup, make sure that:

- the motor is running correctly (no overload, no speed fluctuation, no loud noises, etc.),
- and the correct braking torque is set according to the specific application; see "Technical Data" (page 63) section.

	STOP
	On brake motors with a self-reengaging manual brake release, the hand lever must be removed after startup. A bracket is provided for storing the lever on the outside of the motor.

7 Inspection and Maintenance

⚠ DANGER

Risk of crushing if the hoist falls.

Severe or fatal injuries can occur.

- Secure or lower hoist drives (danger of falling)
- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Only use genuine spare parts in accordance with the valid parts list.
- Always install a new brake control at the same time as replacing the brake coil.

⚠ CAUTION

The surfaces on the drive can be very high during operation.

Danger of burns.

- Let motor cool down before beginning work.

7.1 Inspection and maintenance intervals

Unit / unit part	Time interval	Procedure?
BE brake	• **If used as a working brake:** at least every 3000 hours of operation[1)]	Inspect the brake • measure the brake disc thickness • brake disc, lining • measure and set working air gap • pressure plate • carrier / gearing • pressure rings
	• **If used as a holding brake:** every 2 to 4 years, depending on operating conditions[1)]	• vacuum up any abraded residue • inspect the switch contacts and change if necessary (e.g. in case of burn-out)
Motor	• **Every 10,000 hours of operation**[2)]	Inspect the motor: • check roller bearings and change if necessary • change the oil seal • clean the cooling air passages
Drive	• Varies (depends on external influences)	• Touch up or renew the surfaces / anticorrosion coating

1) the periods of wear are affected by many factors and may be short. The machine designer must calculate the required inspection/maintenance intervals individually in accordance with the project planning documents (e.g. "Project Planning for Drives").

2) For the DR315 with lubrication device, observe the short re-lubrication intervals in the "Bearing lubrication DR315" section.

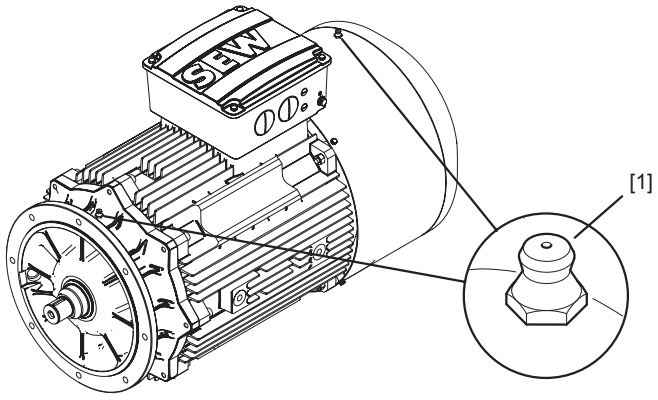
7.2 Bearing lubrication

7.2.1 Bearing lubrication DR71-100

The motor bearings generally come with lubrication for life.

7.2.2 Bearing lubrication DR315

Series 315 motors may be equipped with a lubrication device. The following figure shows the positions of the lubrication devices.



375353099

[1] Lubrication device in type A in accordance with DIN 71412

In normal operating conditions and at an ambient temperature between –20 °C (–4 °F) to 40 °C (104 °F), SEW-EURODRIVE uses a mineral high-performance, high temperature grease for lubrication; a polyurea-based lubricant produced by ESSO Polyrex EM (K2P-20 DIN51825).

For motors in the low temperature range up to –40 °C (–40 °F), the SKF GXN grease is used instead, which is also a mineral polyurea-based grease.

Relubrication

You can purchase the lubricants in 400 g cartridges from SEW-EURODRIVE. For order information, refer to the section, "Lubricant tables for roller bearings of SEW motors" (page 73).

	NOTE
	Only mix lubricants of the same thickness type, the same base oil and the same consistency (NLGI class).

Grease the motor bearings in accordance with the information on the lubricant plate. The used grease collects inside the motor and after every 6-8 re-greasings, this should be removed during an inspection. Each time you re-lubricate, ensure that the bearing is two-thirds full.

After relubricating the motors, you should startup slowly, if possible, so that the grease is distributed evenly.

Relubrication interval

Relubrication interval for bearings

- if the ambient temperature is –20 °C (–4 °F) to 40 °C (104 °F),
- at a 4-pole speed,
- and with a normal load,

are assigned using the table below. At greater speeds, higher loads or higher ambient temperatures, the relubrication intervals are shorter.

	Horizontal mounting position		Vertical mounting position	
Motor type	**Duration**	**Quantity**	**Duration**	**Quantity**
DR315 /NS	5000 h	50 g	3000 h	70 g
DR315 /ERF /NS	3000 h	50 g	2000 h	70 g

7.3 Reinforced bearing

STOP	**STOP**
	In the /ERF (reinforced bearing) option, cylindrical roller bearings are installed on the A side. These must not be operated without an overhung load, otherwise you risk damaging the bearings.

The reinforced bearing is only offered with the /NS (relubrication) option so as to facilitate optimal lubrication of the bearing. For bearing lubrication, refer to the notes in the "Bearing lubrication DR315" section (page 30).

7.4 Preliminary work for motor and brake maintenance

⚠ DANGER

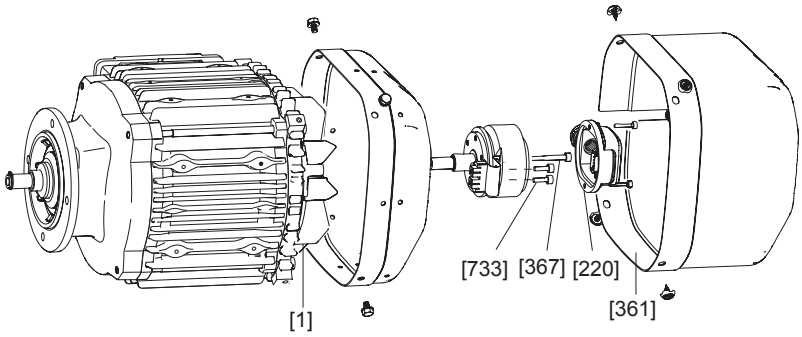
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Before starting work, isolate the motor and brake from the power supply.
- Safeguard against accidental startup.

7.4.1 Removing the incremental encoder from the DR71-100.

The following figure shows how to remove an encoder using the ES7. incremental encoder as example.



179980299

[1] Rotor
[220] Connection cover
[361] Protection cover
[367] Retaining screw
[733] Screws

Removing ES7.

- Remove the protection cover [361].
- Unfasten the expansion anchor by unscrewing the screws [733] from the cover grid.
- Unscrew the central retaining screw [367] by about two to three turns and unfasten the spread shaft cone by tapping lightly on the head of the screw.
- Remove the incremental encoder from the bore of the rotor [1].

Removing AS7.

- Remove the protection cover [361].
- Unscrew the connection cover [220] and remove it. Do not disconnect the encoder connection cable.
- Unfasten the expansion anchor by unscrewing the screws [733] from the cover grid.
- Unscrew the central retaining screw [367] by about two to three turns and unfasten the spread shaft cone by tapping lightly on the head of the screw.
- Remove the incremental encoder from the bore of the rotor [1].

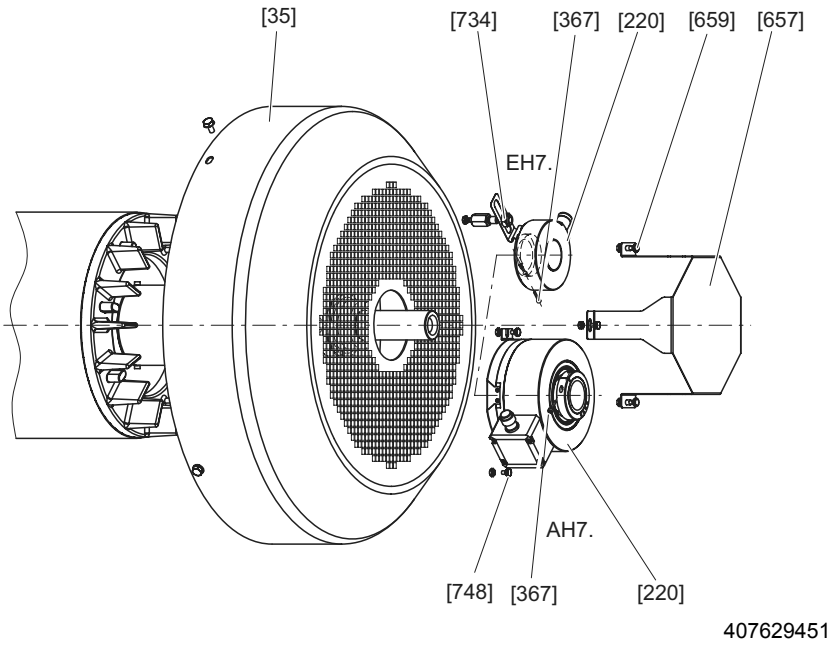
Re-assembly

For re-assembly, please note:

- Apply NOCO® fluid to the encoder spigot.
- Tighten the central retaining screw [367] with a tightening torque of 2.9 Nm (26 in-lb).
- Tighten the screw [733] in the expansion anchor with a tightening torque of max. 1.0 Nm (8.9 in-lb).

7.4.2 Removing the incremental encoder from the DR315

The following figure shows how to remove the incremental encoder on the DR315.



[35] Fan guard
[220] Encoder
[367] Retaining screw
[657] Protection cover
[659] Screw
[734] Nut
[748] Screw

Removing EH7.

- Remove the protection cover [657] by unfastening the screws [659].
- Separate the encoder from the fan guard by loosening the nut [734].
- Unfasten the retaining screw [367] on the encoder and remove the encoder [220] from the shaft.

Removing AH7.

- Remove the protection cover [657] by loosening the screws [659].
- Separate the encoder from the fan guard by loosening the screws [748].
- Unfasten the retaining screw [367] on the encoder [220] and remove the encoder [220] from the shaft.

Re-assembly

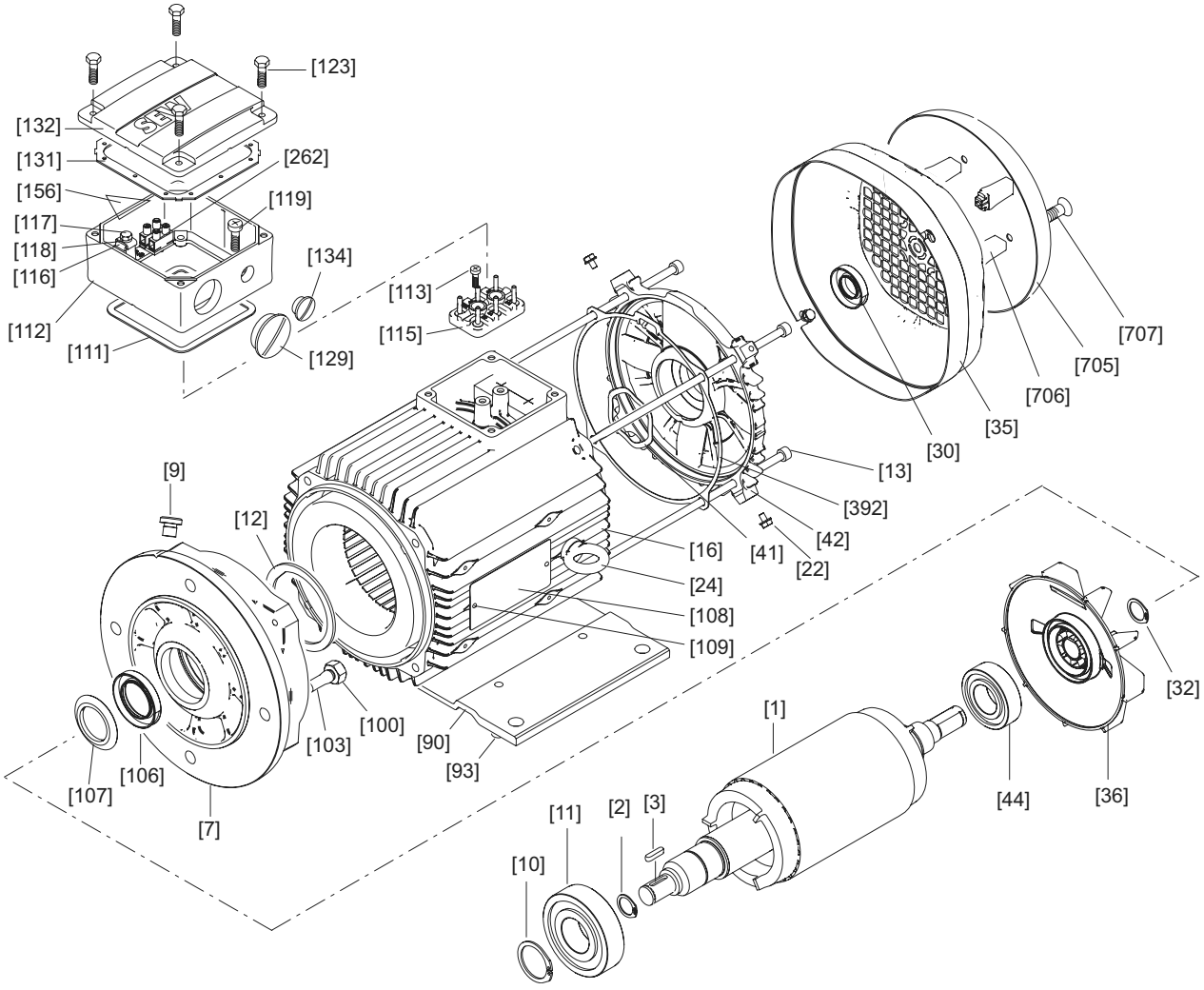
For re-assembly, please note:

- Apply NOCO® fluid to the encoder spigot.
- Tighten the retaining screw with the following tightening torques:

Encoder	Tightening torque
EH7.	0.7 Nm (6 in-lb)
AH7.	3.0 Nm (27 in-lb)

7.5 Inspection and maintenance work on the motor DR71-DR100

7.5.1 Basic structure of DR71-DR100



173332747

[1] Rotor
[2] Circlip
[3] Key
[7] Flanged endshield
[9] Screw plug
[10] Circlip
[11] Deep groove ball bearing
[12] Circlip
[13] Machine screw
[16] Stator
[22] Hex head bolt
[24] Eyebolt
[30] Oil seal
[32] Circlip
[35] Fan guard
[36] Fan
[41] Shim washer
[42] B-side endshield
[44] Deep groove ball bearing
[90] Base plate
[93] Pan head screw
[100] Hex nut
[103] Stud
[106] Oil seal
[107] Oil flinger
[108] Nameplate
[109] Grooved pin
[111] Gasket for lower part
[112] Terminal box lower part
[113] Pan head screw
[115] Terminal board
[116] Terminal clip
[117] Hex head bolt
[118] Lock washer
[119] Pan head screw
[123] Hex head bolt
[129] Screw plug with O-ring
[131] Gasket for cover
[132] Terminal box cover
[134] Screw plug with O-ring
[156] Information sign
[262] Terminal clip, complete
[392] Gasket
[705] Protective cowl
[706] Spacer
[707] Pan head screw

7.5.2 Procedure for inspecting motor DR71-DR100

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Disconnect the motor from the power supply before starting work and safeguard against accidental startup.
- Carefully observe the following operation steps.

1. Remove forced cooling fan and incremental encoder (if installed).

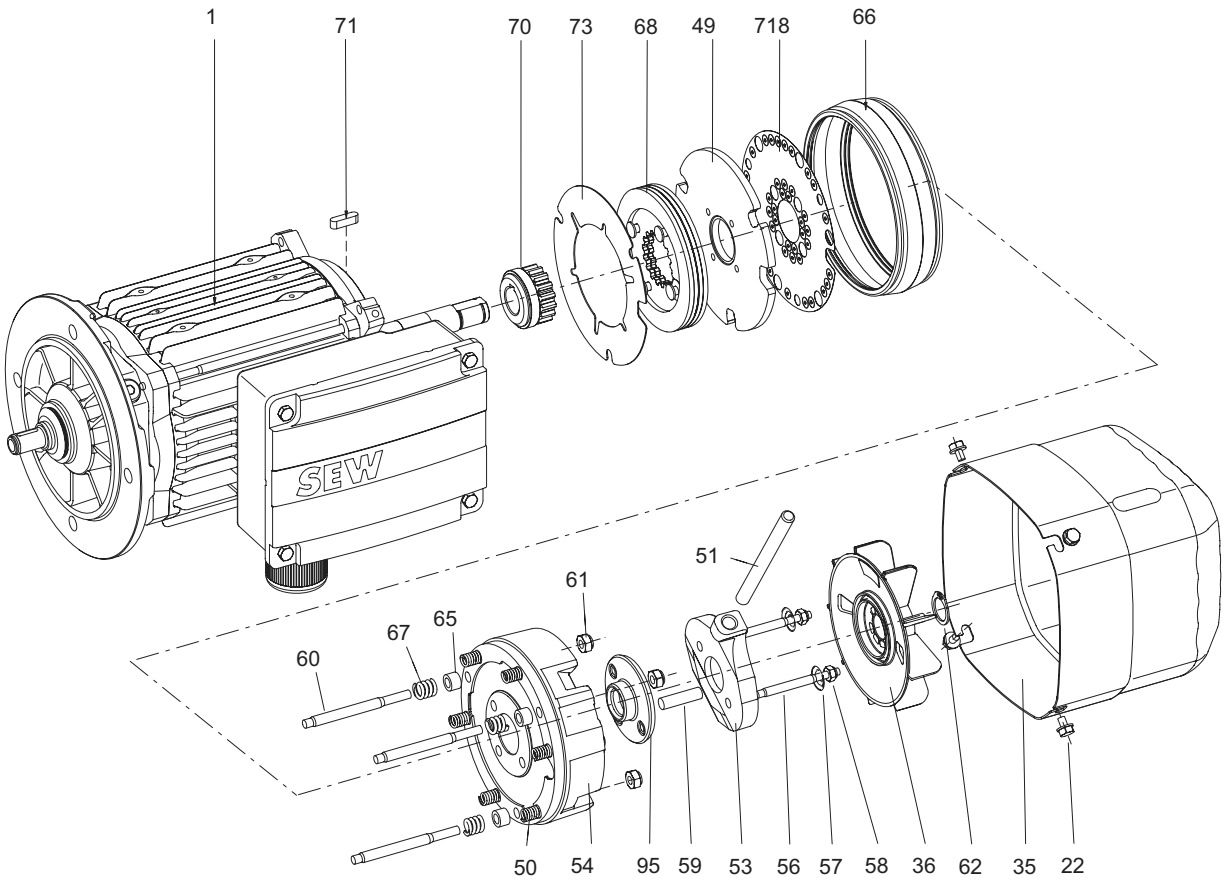
   See section "Preliminary work for motor and brake maintenance" (page 32).
2. Remove fan guard [35] and fan [36].
3. Remove the machine screws [13] from the flanged endshield [7] and the B-side endshield [42] and the stator [16] from the flanged endshield.
4. Visual inspection: are there traces of gear oil or condensation inside the stator?
   - If there are not, proceed to step 7
   - If there is condensation, proceed to step 5
   - If there is gear oil, have the motor repaired by a specialist workshop
5. If there is condensation inside the stator:
   - With gearmotors: remove the motor from the gear unit
   - With motors without a gear unit: remove the A-flange
   - Remove the rotor [1]
6. Clean the winding, dry it and check it electrically see "Preliminary work" section (page 12).
7. Replace the deep groove ball bearings [11] [44] with permitted ball bearings.

   See section "Permitted roller bearing types" (page 72).
8. Reseal the shaft:
   - A-side: Replace oil seal [106]
   - B-side: Replace oil seal [30]

     Coat the sealing lip with grease (Klüber Petamo GHY 133).
9. Reseal the stator seat:
   - Seal the sealing surface with a duroplastic sealing compound (operating temperature –40 °C [–40 °F]...180 °C [356 °F]), such as "Hylomar L Spezial".
   - Replace gasket [392]
10. Install the motor and accessory equipment.

7.6 Inspection and maintenance for brake motor DR71-DR100

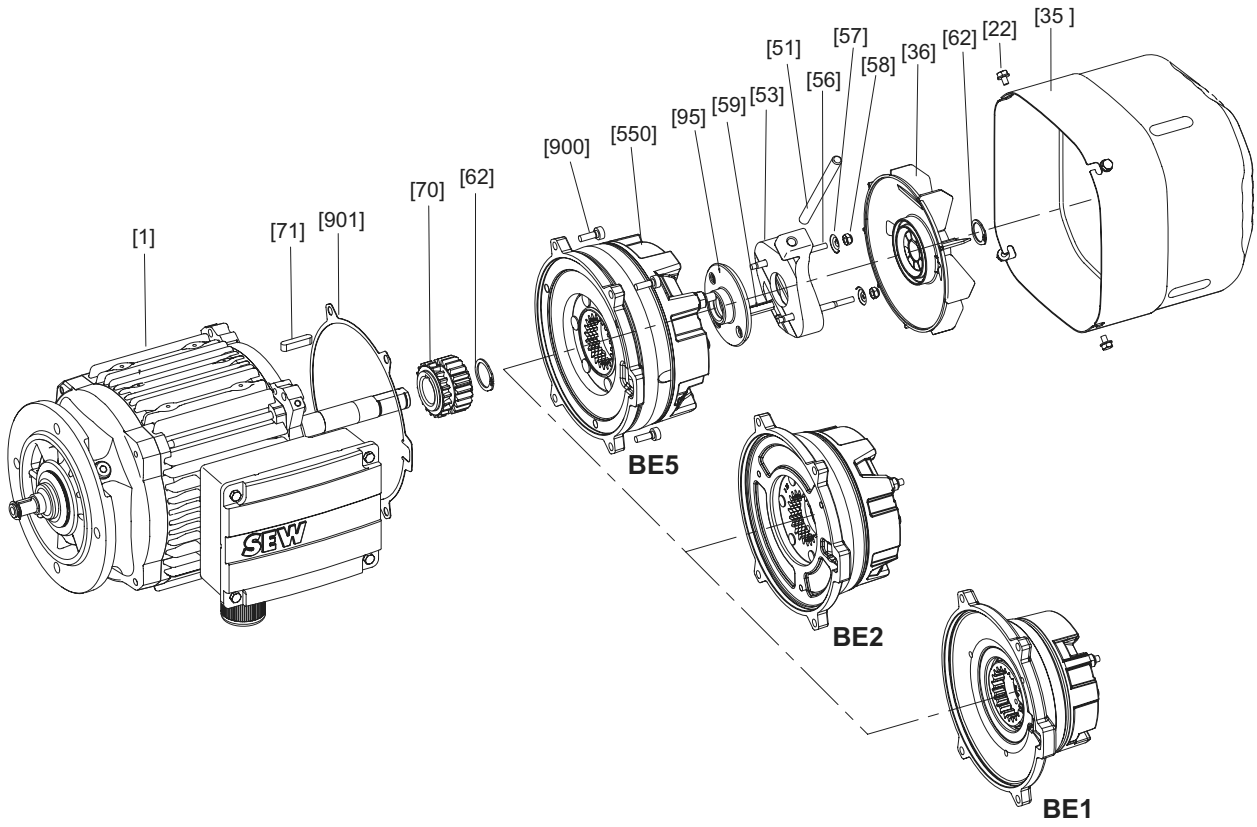
7.6.1 Basic structure of brake motor DR71, DR80



174200971

[1] Motor with brake endshield
[22] Hex head bolt
[35] Fan guard
[36] Fan
[49] Pressure plate
[50] Brake spring
[51] Hand lever
[53] Releasing lever
[54] Magnet, complete
[56] Stud
[57] Conical coil spring
[58] Setting nut
[59] Parallel pin
[60] Stud 3x
[61] Hex nut
[62] Circlip
[65] Pressure ring
[66] Rubber sealing collar
[67] Counter spring
[68] Brake disc
[70] Carrier
[71] Key
[73] Stainless steel shim plate
[95] Sealing ring
[718] Damping plate

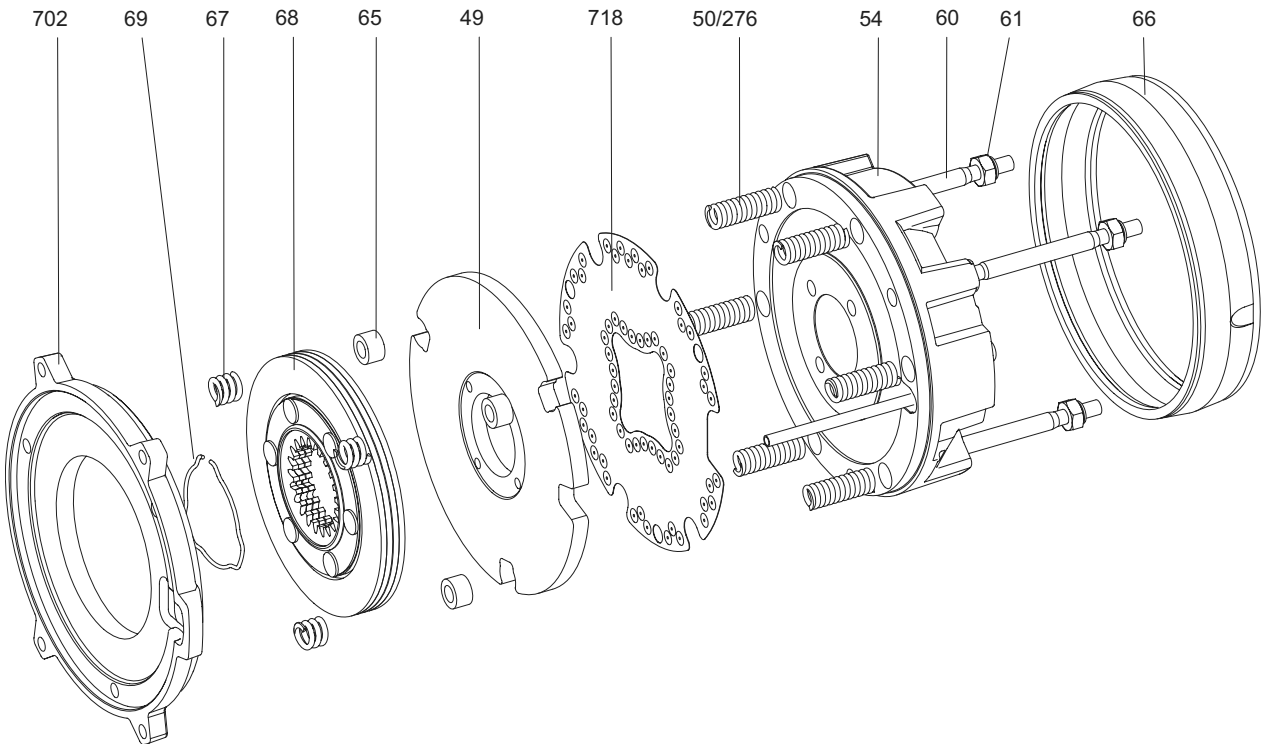
7.6.2 Basic structure of brake motor DR90, DR100



179981963

[1] Motor with brake endshield
[22] Hex head bolt
[35] Fan guard
[36] Fan
[51] Hand lever
[53] Releasing lever
[56] Stud
[57] Conical coil spring
[58] Setting nut
[59] Parallel pin
[62] Circlip
[70] Carrier
[95] Sealing ring
[550] Pre-assembled brake
[900] Screw
[901] Gasket

7.6.3 Basic structure of brake BE05-BE5



[49] Pressure plate
[50] Brake spring (standard)
[54] Magnet, complete
[60] Stud 3x
[61] Hex nut
[65] Pressure ring
[66] Rubber sealing collar
[67] Counter spring
[68] Brake disc
[69] Annular spring
[276] Brake spring (blue)
[702] Friction disc
[718] Damping plate

7.6.4 Procedure for inspecting brake motor DR71-DR100

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove forced cooling fan and incremental encoder (if installed).

   See section "Preliminary work for motor and brake maintenance" (page 32).
2. Remove fan guard [35] and fan [36].
3. Remove machine screws [13] from the flanged endshield [7] and take the B-side endshield [42] and stator [16] off the flanged endshield.
4. Remove the terminal box cover and unfasten the brake cable from the rectifier.
5. Push the brake off the stator and carefully lift it off.
6. Pull the stator back by approx. 3 – 4 cm (1 – 2 in).
7. Visual inspection: are there traces of gear oil or condensation inside the stator?
   - If there are not, proceed to step 10
   - If there is condensation, proceed to step 8
   - If there is gear oil, have the motor repaired by a specialist workshop
8. If there is condensation inside the stator:
   - With gearmotors: remove the motor from the gear unit
   - With motors without a gear unit: remove the A-flange
   - Remove the rotor [1]
9. Clean the winding, dry it and check it electrically see "Preliminary work" section (page 12).
10. Replace the deep groove ball bearings [11] [44] with permitted ball bearings.

    See section "Permitted roller bearing types" (page 72).
11. Reseal the shaft:
    - A-side: Replace oil seal [106]
    - B-side: Replace oil seal [30]

      Coat the sealing lip with grease (Klüber Petamo GHY 133).
12. Reseal the stator seat:
    - Seal the sealing surface with a duroplastic sealing compound (operating temperature –40 °C [–40 °F]...180 °C [356 °F]), such as "Hylomar L Spezial".
    - Replace gasket [392]
13. Install the motor, brake and accessory equipment.

7.6.5 Setting the working air gap for brake BE05-BE5

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

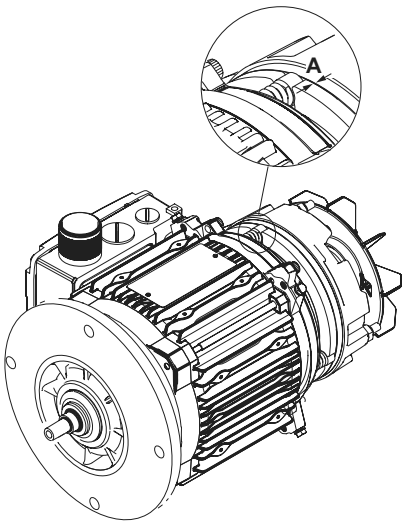
Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)
     see section "Preliminary work for motor and brake maintenance" (page 32).
   - Flange cover or fan guard [21]
2. Push the rubber sealing collar [5] aside,
   - release the clip to do this, if necessary
   - vacuum up any abraded residue
3. Measure the brake disc [68]:
   - if the brake disc ≤ 9 mm, (on motors up to DR100), replace the brake disc.

     See section "Replacing the brake disc for brake BE05-BE5" (page 41).
4. Measure the working air gap A (see following figure)

   (use a feeler gauge and measure at three points offset by 120°):
   - between the pressure plate [49] and damping plate [718]
5. Tighten the hex nuts [61]:
6. Tighten the setting sleeves
   - until the working air gap is set correctly; see "Technical Data" section (page 63).
7. Put the rubber sealing collar back in place and re-install the dismantled parts.



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7.6.6 Replacing the brake disc for brake BE05-BE5

When fitting a new brake disc (thickness ≤ 9 mm), also inspect the other removed parts and, if necessary, install new ones.

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

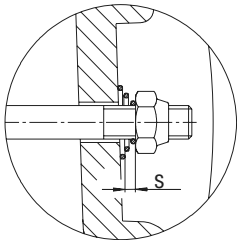
NOTE

- The brake for motor sizes DR 71-80 cannot be removed from the motor because the BE brake is directly installed on the brake endshield of the motor.
- With motor sizes DR 90-100, you can remove the brakes when changing the brake disc, as the BE brake is pre-assembled on the motor's brake endshield on top of a friction disc.

1. Remove the following:
   - forced cooling fan and incremental encoder (if installed)
     See section "Preliminary work for motor and brake maintenance" (page 32).
   - flange cover or fan guard [35], circlip [62] and fan [36]
2. Remove the rubber sealing collar [66] and the manual brake release:
   - setting nuts [58], conical coil springs [57], studs [56], releasing lever [53], spiral dowel pin [59]
3. Unfasten hex nuts [61], carefully pull off the brake coil body [54] (brake cable) and remove the brake springs [50].
4. Remove the damping plate [718], pressure plate [49] and brake disc [68], and clean the brake components.
5. Install a new brake disc.
6. Re-install the brake components,
   - except for the fan and the fan guard, because the working air gap has to be set first see section "Setting the working air gap for brake BE05-BE5" (page 40).

7. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



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Brake	Floating clearance "s" [mm]
BE05; BE1	1.5
BE2; BE5	2

8. Put the rubber sealing collar back in place and re-install the dismantled parts.

NOTE

- The lockable manual brake release (type HF) is already released if a resistance is encountered when operating the setscrew.
- The self-reengaging manual brake release (type HR) can be operated with normal hand pressure.
- In brake motors with self-reengaging manual brake release, the manual brake release lever must be removed after startup/maintenance. A bracket is provided for storing the lever on the outside of the motor.

NOTE

Important: after replacing the brake disc, the maximum braking torque is reached only after several cycles.

7.6.7 Changing the braking torque of brake BE05-BE5

The braking torque can be altered in stages,

- by changing the type and number of brake springs
- by changing the complete magnet (only possible for BE05 and BE1)
- by changing the brake (from motor size DR90)

To find the possible braking torque graduations for each motor, refer to the "Technical Data" section (page 63).

Changing the brake spring

DANGER

Risk of crushing if the drive starts up unintentionally.

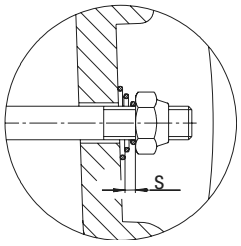
Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove the following:
   - forced cooling fan and incremental encoder (if installed)
     See section "Preliminary work for motor and brake maintenance" (page 32).
   - flange cover or fan guard [35], circlip [62] and fan [36]
2. Remove the rubber sealing collar [66] and the manual brake release:
   - setting nuts [58], conical coil springs [57], studs [56], releasing lever [53], spiral dowel pin [59]
3. Unfasten hex nuts [61] and pull off the brake coil body [54]
   - By approx. 50 mm (2.0 in) (watch the brake cable)
4. Change or add brake springs [50/276]
   - Position the brake springs symmetrically
5. Re-install the brake components,
   - except for the fan and the fan guard, because the working air gap has to be set first see section "Setting the working air gap for brake BE05-BE5" (page 40).

6. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



177241867

Brake	Floating clearance "s" [mm]
BE05; BE1	1.5
BE2; BE5	2

7. Put the rubber sealing collar back in place and re-install the dismantled parts.

	NOTE
	Replace setting nuts [58] and hex nuts [61] if the removal procedure is repeated.

Changing the magnet

⚠ DANGER

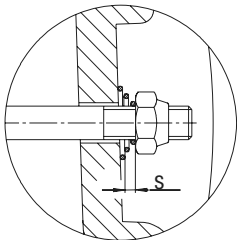
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove the following:
   - forced cooling fan and incremental encoder (if installed)
     See section "Preliminary work for motor and brake maintenance" (page 32).
   - flange cover or fan guard [35], circlip [62] and fan [36]
2. Remove the rubber sealing collar [66] and the manual brake release:
   - setting nuts [58], conical coil springs [57], studs [56], releasing lever [53], spiral dowel pin [59]
3. Remove the terminal box cover and loosen the brake cable from the rectifier. If necessary, attach trailing wire to brake cables.
4. Unfasten hex nuts [61], remove complete magnet [54], replace brake springs [50/276].
5. Re-install the brake components,
   - except for the fan and the fan guard, because the working air gap has to be set first see section "Setting the working air gap for brake BE05-BE5" (page 40).
6. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



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Brake	Floating clearance "s" [mm]
BE05; BE1	1.5
BE2; BE5	2

7. Put the rubber sealing collar back in place and re-install the dismantled parts.

Replacing the brake on DR71 and DR80

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

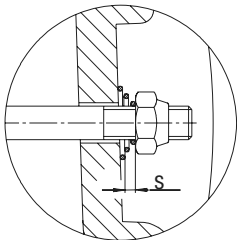
Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove the following:
   - forced cooling fan and incremental encoder (if installed)
     See section "Preliminary work for motor and brake maintenance" (page 32).
   - flange cover or fan guard [35], circlip [62] and fan [36]
2. Remove the terminal box cover and loosen the brake cable from the rectifier. If necessary, attach trailing wire to brake cables.
3. Loosen machine screws [13] and remove brake endshield with brake from stator.
4. Guide the brake cable into the terminal box.
5. Align the cam of the brake endshield.

   Notes for BE05 and BE1 installed on the DR80: You can only turn the brake against the shaft as long as the brake is not making contact with the carrier. Turning the brake on the shaft can destroy the brake disc of the brake. Turning the whole brake, including the shaft, is permitted.
6. Mount oil seal [95].
7. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



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Brake	Floating clearance "s" [mm]
BE05; BE1	1.5
BE2	2

Replacing the brake on DR90 and DR100

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

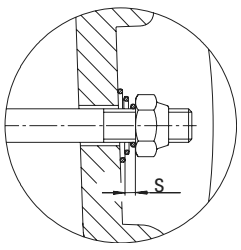
Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove the following:
   - forced cooling fan and incremental encoder (if installed)
     See section "Preliminary work for motor and brake maintenance" (page 32).
   - flange cover or fan guard [35], circlip [62] and fan [36]
2. Remove the terminal box cover and loosen the brake cable from the rectifier. If necessary, attach trailing wire to brake cables.
3. Unfasten screws [900] and remove brake from brake endshield.
4. Pay attention to the alignment of the gasket [901].
5. Guide the brake cable into the terminal box.
6. Align the cam of the friction disc.

   Note for BE1: You can only turn the brake against the shaft as long as the brake is not making contact with the carrier. Turning the brake on the shaft can destroy the brake disc of the brake. Turning the whole brake, including the shaft, is permitted.
7. Mount oil seal [95].
8. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



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Brake	Floating clearance "s" [mm]
BE1	1.5
BE2; BE5	2

7.6.8 Retrofitting the manual brake release HR/HF

⚠ DANGER

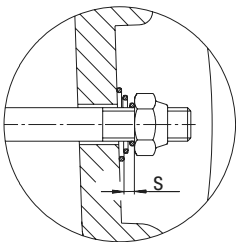
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove the following:
   - forced cooling fan and incremental encoder (if installed)
     See section "Preliminary work for motor and brake maintenance" (page 32).
   - flange cover or fan guard [35], circlip [62] and fan [36]
2. Sealing ring [95].
3. Screw in studs [56], insert sealing ring [95], and hammer in the parallel pin [59].
4. Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



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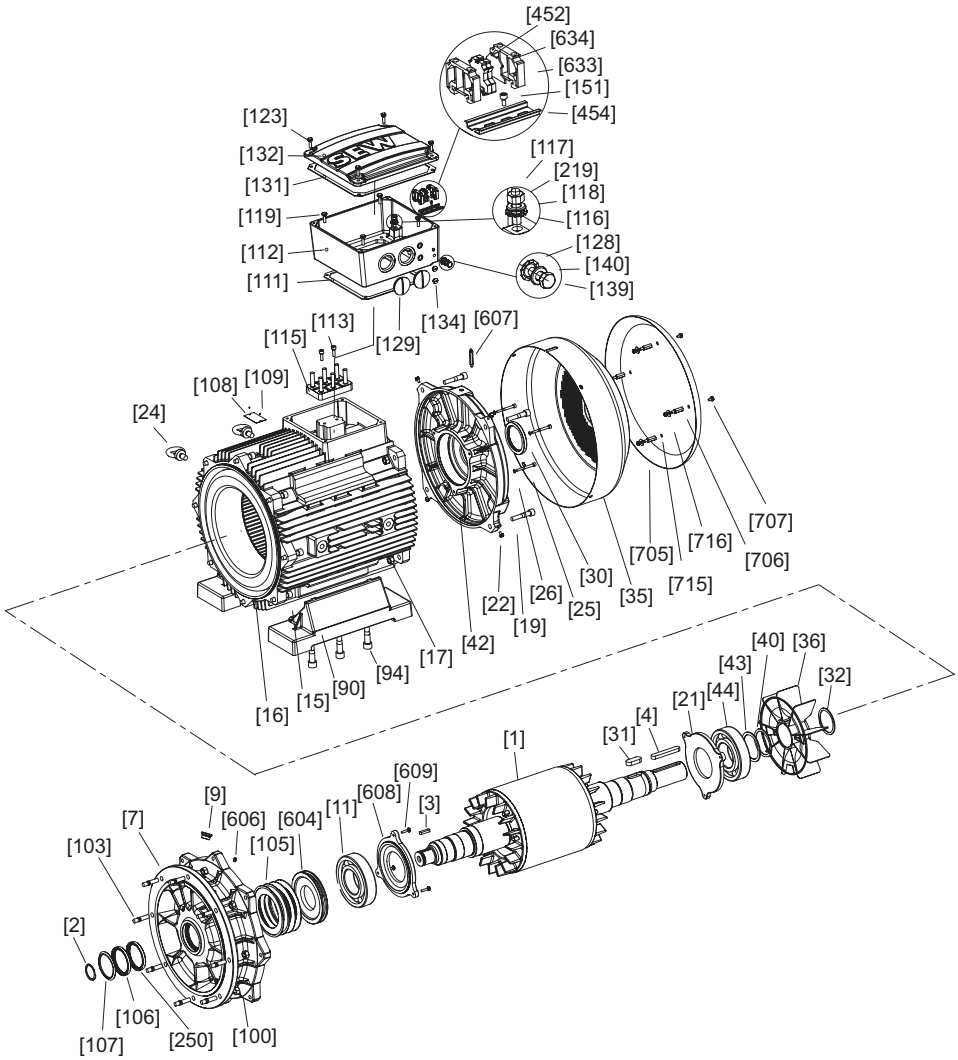
Brake	Floating clearance "s" [mm]
BE05; BE1	1.5
BE2; BE5	2

5. Reassemble the removed parts.

7.7 Inspection and maintenance work on the motor DR315

7.7.1 Basic structure of the motor DR315



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[1] Rotor
[2] Circlip
[3] Key
[4] Key
[7] Flange
[9] Screw plug
[11] Roller bearing
[15] Machine screw
[16] Stator
[17] Hex nut
[19] Machine screw
[21] Oil seal flange
[22] Hex head bolt
[24] Eyebolt
[25] Machine screw
[26] Sealing washer
[30] Oil seal
[31] Key
[32] Circlip
[35] Fan guard
[36] Fan
[40] Circlip
[42] B-side endshield
[43] Supporting ring
[44] Roller bearing
[90] Foot mounting
[94] Machine screw
[100] Hex nut
[103] Stud
[105] Cup spring
[106] Oil seal
[107] Oil flinger
[108] Nameplate
[109] Grooved pin
[111] Gasket for lower part
[112] Terminal box lower part
[113] Machine screw
[115] Terminal board
[116] Serrated lock washer
[117] Stud
[118] Washer
[119] Hex head bolt
[123] Hex head bolt
[128] Serrated lock washer
[129] Screw plug
[131] Gasket for cover
[132] Terminal box cover
[134] Screw plug
[139] Hex head bolt
[140] Washer
[151] Machine screw
[219] Hex nut
[250] Oil seal
[452] Terminal strip
[454] Top hat rail
[604] Lubrication ring
[606] Greasing nipple
[607] Greasing nipple
[608] Oil seal flange
[609] Hex head bolt
[633] End bracket
[634] End plate
[705] Protective cowl
[706] Spacer bolt
[707] Hex head bolt
[715] Hex nut
[716] Washer

7.7.2 Procedure for inspecting motor DR315

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Disconnect the motor from the power supply before starting work and safeguard against accidental startup.
- Carefully observe the following operation steps.

1. Remove forced cooling fan and incremental encoder (if installed).

   See section "Preliminary work for motor and brake maintenance" (page 32).

   With gearmotors: Remove the motor from the gear unit.
2. Remove fan guard [35] and fan [36].
3. Unfasten machine screws [25] and [19] and remove B-side endshield [42].
4. Unfasten machine screws [15] from the flange [7] and remove the complete rotor [1] together with the flange. With gearmotors, pull off the oil flinger [107].
5. Loosen screws [609] and separate the rotor from the flange [7]. Before disassembly, protect the oil seal seat against damage using adhesive tape or a protective sleeve.
6. Visual inspection: are there traces of gear oil or condensation inside the stator?
   - If there are not, proceed to step 8
   - If there is condensation, continue with 7
   - If there is gear oil, have the motor repaired by a specialist workshop
7. If there is condensation inside the stator:

   Clean the winding, dry it and check it electrically see "Preliminary work" section (page 12).
8. Replace the roller bearings [11], [44] with permitted roller bearing types.

   See section "Permitted roller bearing types" (page 72).

   Fill the bearing with grease until it is two-thirds full.

   See section "Bearing lubrication DR315" (page 30).

   Important: place the oil seal flange, [608] and [21], onto the rotor shaft before installing the bearings.
9. Starting on the A-side, mount the motor vertically.
10. Place the cup springs [105] and lubrication ring [604] into the bearing bore of the flange [7].

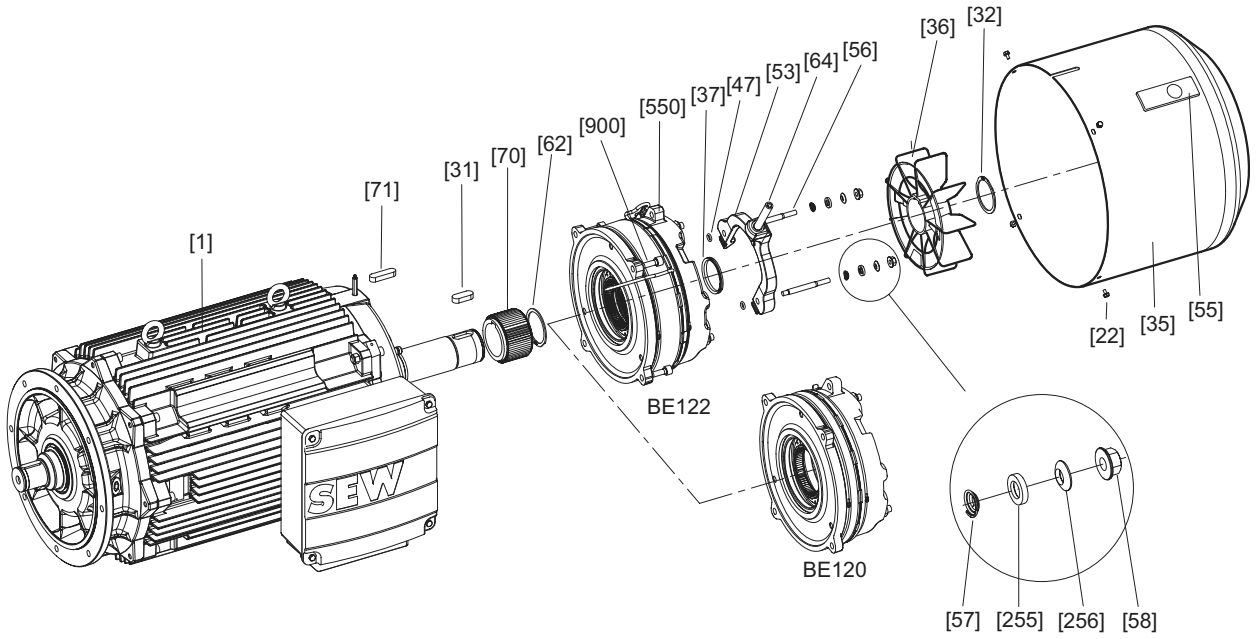
    Hang the rotor [1] onto the B-side thread, and guide into the flange [7].

    Fasten the oil seal flange [608] to the flange [7] using the hex head bolts [609].

11. Mount the stator [16].
    - Reseal the stator seat: seal the sealing surface with a duroplastic sealing compound (operating temperature –40 °C [–40 °F]...180 °C [356 °F]), such as "Hylomar L Spezial".
      Important: Protect the winding overhead from damage.
    - Screw in the stator [16] and flange [7] with screws [15].
12. Before mounting the B-side endshield [42], screw in the M8 setscrew approximately 200 mm (7.87 in) into the oil seal flange [21].
13. Before mounting the B-side endshield [42], feed the setscrew in through a bore for the screw [25]. Screw in the B-side endshield [42] and stator [16] using machine screws [19] and hex nuts [17]. Lift the oil seal flange [21] with the setscrew, and fasten using 2 screws [25]. Remove the setscrew and screw in the remaining screws [25].
14. Renew oil seals
    - A-side: insert the oil seal [106] and the oil seal [250] for gearmotors.
      With gearmotors, fill the space between the two oil seals approx. two-thirds full with grease (Klüber Petamo GHY133).
    - B-side: insert the oil seal [30], and coat the sealing lip with the same grease.
15. Install the fan [36] and fan guard [35].

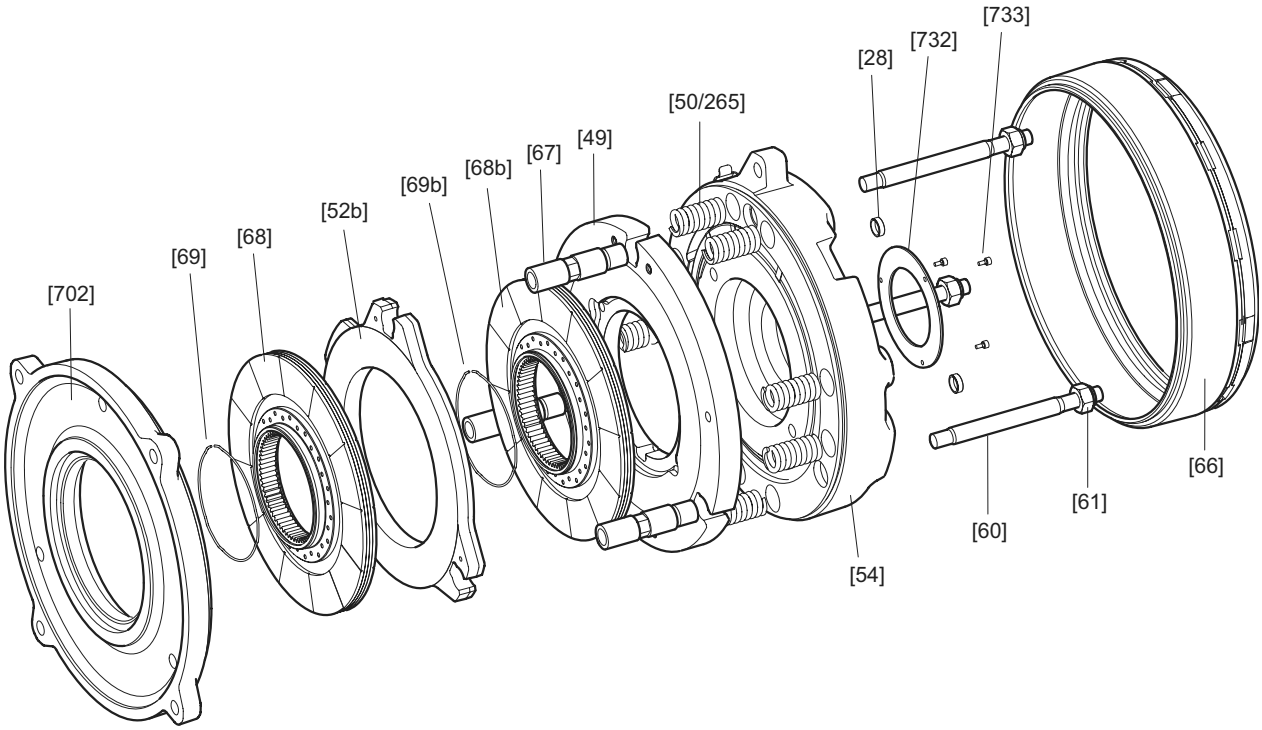
7.8 Inspection and maintenance for brake motor DR315

7.8.1 Basic structure of brake motor DR315



[1] Motor with brake endshield
[22] Hex head bolt
[31] Key
[32] Circlip
[35] Fan guard
[36] Fan
[37] V-ring
[47] O-ring
[53] Releasing lever
[55] Closing piece
[56] Stud
[57] Conical coil spring
[58] Setting nut
[62] Circlip
[64] Setscrew
[70] Carrier
[71] Key
[255] Conical seat
[256] Spherical washer
[550] Pre-assembled brake
[900] Screw
[901] Gasket

7.8.2 Basic structure of brake BE120-BE122



[28]	Closing cap	[66]	Rubber sealing collar	[702]	Friction disc
[49]	Pressure plate	[67]	Setting sleeve	[732]	Cover disc
[50]	Brake spring	[68]	Brake disc	[733]	Screw
[52b]	Brake stationary disc (BE122 only)	[68b]	Brake disc (BE122 only)		
[54]	Magnet, complete	[69]	Annular spring		
[60]	Stud 3x	[69b]	Annular spring (BE122 only)		
[61]	Hex nut	[256]	Brake spring		

7.8.3 Procedure for inspecting brake motor DR315

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove forced cooling fan and incremental encoder (if installed)

   See section "Preliminary work for motor and brake maintenance" (page 32).
2. Remove fan guard [35] and fan [36]
3. Unfasten brake connector
4. Loosen screws [900] and remove pre-assembled brake [550] from brake endshield.
5. Unfasten machine screws [25] and [19] and remove B-side endshield [42].
6. Unfasten machine screws [15] from the flange [7] and remove the complete rotor [1] together with the flange. With gearmotors, pull off the oil flinger [107].
7. Loosen screws [609] and separate the rotor from the flange [7]. Before disassembly, protect the oil seal seat from damage using adhesive tape or a protective sleeve.
8. Visual inspection: are there traces of gear oil or condensation inside the stator?
   – If there are not, proceed to step 8
   – If there is condensation, continue with 7
   – If there is gear oil, have the motor repaired by a specialist workshop
9. If there is condensation inside the stator:

   Clean the winding, dry it and check it electrically; see "Preliminary work" section (page 32).
10. Replace the roller bearings [11], [44] with permitted roller bearing types.

    See section "Permitted roller bearing types" (page 72).

    Fill the bearing with grease until it is two-thirds full.

    See section "Bearing lubrication DR315" (page 30)

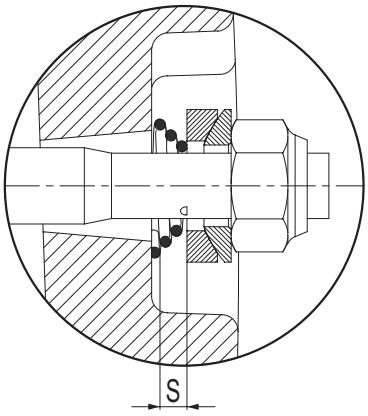
    Important: place the oil seal flange, [608] and [21], onto the rotor shaft before installing the bearings.
11. Starting on the A-side, mount the motor vertically.
12. Place the cup springs [105] and lubrication ring [604] into the bearing bore of the flange [7].

    Hang the rotor [1] onto the B-side thread, and guide into the flange [7].

    Fasten the oil seal flange [608] to the flange [7] using the hex head bolts [609].

13. Mount the stator [16].
    - Reseal the stator seat: seal the sealing surface with a duroplastic sealing compound (operating temperature –40 °C [–40 °F]...180 °C [356 °F]), such as "Hylomar L Spezial".
      Important: Protect the winding overhead from damage.
    - Screw in the stator [16] and flange [7] with screws [15].
14. Before mounting the brake endshield, screw in the M8 setscrew approximately 200 mm (7.87 in) into the oil seal flange [21].
15. Before mounting the brake endshield [42], feed the setscrew in through a bore for the screw [25]. Screw in the brake endshield and stator [16] using machine screws [19] and hex nuts [17]. Lift the oil seal flange [21] with the setscrew, and fasten using 2 screws [25]. Remove the setscrew and screw in the remaining screws [25].
16. Renew oil seals
    - A-side: insert the oil seals [106] and the oil seal [250] for gearmotors.
      Fill the space between the two oil seals approx. two-thirds full with grease (Klüber Petamo GHY133).
    - B-side: insert the oil seal [30], and coat the sealing lip with the same grease. This condition applies only to gearmotors
17. Align the cam of the friction disc, and mount the brake onto the brake endshield using a screw [900].
18. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

    The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



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Brake	Floating clearance "s" [mm]
BE120; BE122	2

19. Install the fan [36] and fan guard [35].
20. Install the motor and accessory equipment.

7.8.4 Setting the working air gap for brake BE120-BE122

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

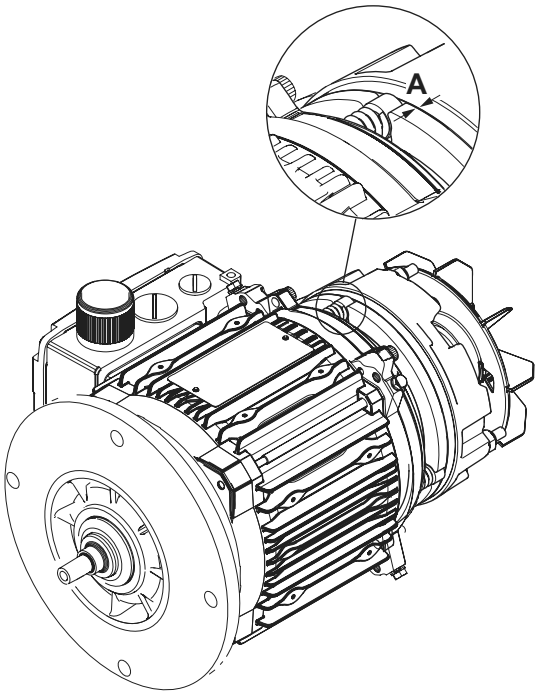
1. Remove forced cooling fan and incremental encoder (if installed)

   See section "Preliminary work for motor and brake maintenance" (page 32)
2. Remove fan guard [35] and fan [36]
3. Push the rubber sealing collar [66] aside,
   – release the clip to do this, if necessary
   – vacuum up any abraded residue
4. Measure the brake disc [68, 68b]:

   Replace the brake disc if the brake disc ≤ 12 mm (0.47 in).

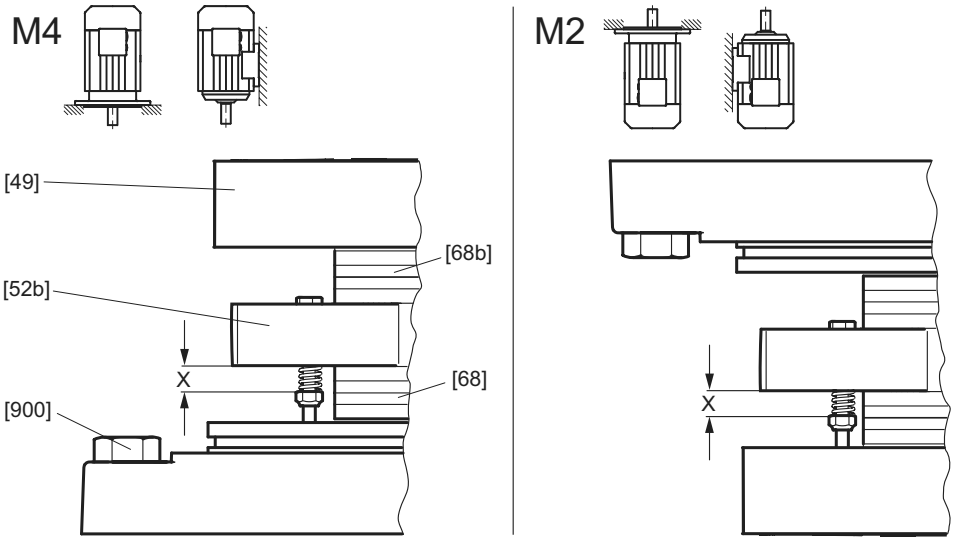
   See section "Replacing the brake disc for brake BE120-BE122" (page 58)
5. Unfasten the setting sleeve [67] by turning it towards the endshield
6. Measure the working air gap A (see following figure)

   (use a feeler gauge and measure at three points offset by 120°):



7. Tighten the hex nuts [61]
8. If you are mounting the BE122 in a vertical position, set the 3 springs on the brake stationary disc to the following measurement:

Mounting position	X in [mm]
M4	10.0
M2	10.5



[49] Pressure plate
[52b] Brake stationary disc (BE122 only)
[68] Brake disc
[68b] Brake disc (BE122 only)
[900] Hex nut

9. Tighten the setting sleeves
   - towards the magnet
   - until the working air gap is set correctly; see "Technical Data" section (page 63)
10. Put the rubber sealing collar back in place and re-install the dismantled parts.

7.8.5 Replacing the brake disc for brake BE120-BE122

When fitting a new brake disc (thickness ≤ 12 mm (0.47 in)), also inspect the other removed parts and, if necessary, install new ones.

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

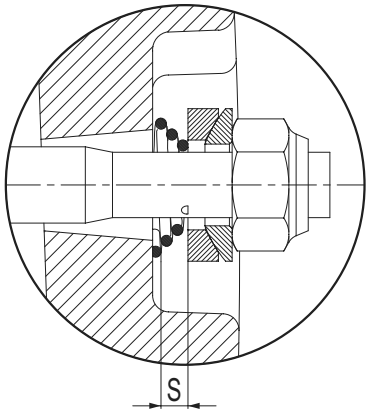
- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove forced cooling fan and incremental encoder (if installed)

   See section "Preliminary work for motor and brake maintenance" (page 32)
2. Remove the fan guard [35], circlip [32] and fan [36]
3. Loosen the plug connector on the magnet
4. Remove the rubber sealing collar [66] and the manual brake release:
   – setting nuts [58], conical seat [255], spherical washer [256], conical coil springs [57], studs [56], releasing lever [53]
5. Unfasten hex nuts [61], carefully remove complete magnet [54] and remove brake springs [50/265].
6. Remove the pressure plate [49] and brake disc [68b], and clean the brake components.
7. Install a new brake disc.
8. Re-install the brake components,
   – except for the fan and the fan guard, because the working air gap has to be set first see section "Setting the working air gap for brake BE120-BE122" (page 56).

9. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



353592459

Brake	Floating clearance "s" [mm]
BE120; BE122	2

10. Put the rubber sealing collar back in place and re-install the dismantled parts.

NOTE

- The lockable manual brake release (type HF) is already released if a resistance is encountered when operating the setscrew.
- After replacing the brake disc, the maximum braking torque is reached only after several cycles.

7.8.6 Changing the braking torque of brake BE120-BE122

The braking torque can be altered in stages,

- by changing the type and number of brake springs
- by changing the brake

To find the possible braking torque graduations for each motor, refer to the "Technical Data" section (page 63).

Changing the brake spring

⚠ DANGER

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries can occur.

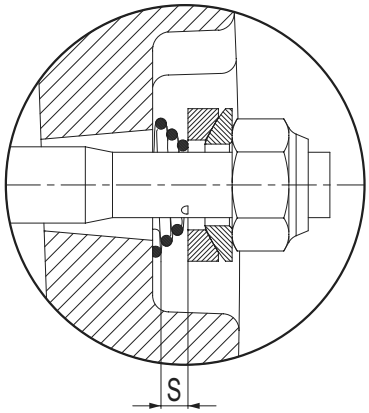
- Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup.
- Carefully observe the following operation steps.

1. Remove forced cooling fan and incremental encoder (if installed)

   See section "Preliminary work for motor and brake maintenance" (page 32)
2. Remove the flange cover or fan guard [35], circlip [32] and fan [36].
3. Unfasten the plug connector on the magnet [54] and protect it from getting dirty
4. Remove the rubber sealing collar [66] and the manual brake release:
   – setting nuts [58], conical seat [255], spherical washer [256], conical coil springs [57], setscrews [56], releasing lever [53]
5. Unfasten hex nuts [61] and pull off the magnet [54]
   – by approx. 50 mm (2.0 in)
6. Change or add brake springs [50/265]
   – Position the brake springs symmetrically
7. Re-install the brake components,
   – except for the fan and the fan guard, because the working air gap has to be set first see section "Setting the working air gap for brake BE120-BE122" (page 56).

8. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



353592459

Brake	Floating clearance "s" [mm]
BE120; BE122	2

9. Put the rubber sealing collar back in place and re-install the dismantled parts.

	NOTE
	Replace setting nuts [58] and hex nuts [61] if the removal procedure is repeated.

Replacing the brake on DR315

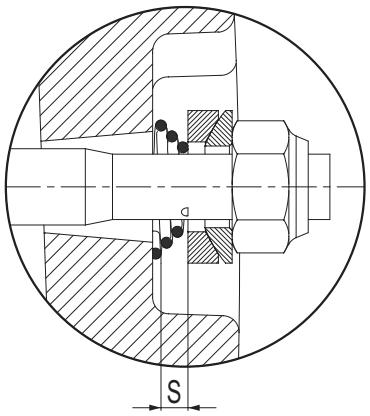
STOP	**STOP**
	The mounting position for installation should correspond to the specifications on the nameplate; make sure that the intended mounting position is permitted.

	⚠ DANGER
	Risk of crushing if the drive starts up unintentionally. Severe or fatal injuries can occur. • Isolate the motor and brake from the power supply before starting work, safeguarding them against accidental startup. • Carefully observe the following operation steps.

1. Remove forced cooling fan and incremental encoder (if installed)

   See section "Preliminary work for motor and brake maintenance" (page 32)
2. Remove the flange cover or fan guard [35], circlip [32] and fan [36]
3. Unfasten brake connector
4. Unfasten screws [900] and remove brake from brake endshield.
5. Align the cam of the friction disc, and mount the brake onto the brake endshield using a screw [900].
6. With manual brake release: use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see the following figure).

   The floating clearance "s" is necessary so that the pressure plate can move up as the brake lining wears. Otherwise, reliable braking is not guaranteed.



353592459

Brake	Floating clearance "s" [mm]
BE120; BE122	2

8 Technical Data

8.1 Work done, working air gap, braking torques

Brake type	Work done until maintenance	Working air gap [mm]		Braking torque settings				
				Braking torque	Type and number of brake springs		Order numbers for brake springs	
	[10^6 J] ([in-lb])	min.[1]	max.	[Nm] ([in-lb])	Normal	Blue	Normal	Blue
BE05	120 (1060)	0.25	0.6	5.0 (44) 3.5 (31) 2.5 (22) 1.8 (16)	2 2 – –	4 2 6 3	0135 017 X	1374 137 3
BE1	120 (1060)	0.25	0.6	10 (89) 7.0 (62) 5.0 (44)	6 4 2	– 2 4	0135 017 X	1374 137 3
BE2	165 (1460)	0.25	0.6	20 (180) 14 (120) 10 (89) 7.0 (62)	6 2 2 –	– 4 2 4	1374 024 5	1374 052 0
BE5	260 (2300)	0.25	0.9	55 (490) 40 (350) 28 (250) 20 (180)	4 2 2 –	2 4 2 4	1374 070 9	1374 071 7
BE120	520 (4600)	0.4	1.2	1000 (8851) 800 (7080) 600 (5310) 400 (3540)	8 6 4 4	– 2 4 –	1360 877 0	1360 831 2
BE122	520 (4600)	0.5	1.2	2000 (17700) 1600 (14160) 1200 (10620) 800 (7080)	8 6 4 4	– 2 4 –	1360 877 0	1360 831 2

1) Please note when checking the working air gap: Parallelism tolerances on the brake disc may cause deviations of ±0.15 mm after a test run.

8.2 Braking torque breakdown

8.2.1 Motor size DR71-100

Motor type	Brake type	Braking torque gradation in Nm ([in-lb])										
DR71	BE05	1.8 (16)	2.5 (22)	3.5 (31)	5.0 (44)							
	BE1				5.0 (44)	7.0 (62)	10.0 (88.5)					
DR80	BE05	1.8 (16)	2.5 (22)	3.5 (31)	5.0 (44)							
	BE1				5.0 (44)	7.0 (62)	10 (89)					
	BE2					7.0 (62)	10 (89)	14 (120)	20 (180)			
DR90	BE1				5.0 (44)	7.0 (62)	10 (89)					
	BE2					7.0 (62)	10 (89)	14 (120)	20 (180)			
	BE5								20 (180)	28 (250)	40 (350)	55 (490)
DR100	BE2					7.0 (62)	10 (89)	14 (120)	20 (180)			
	BE5								20 (180)	28 (250)	40 (350)	55 (490)

8.2.2 Motor size DR315

Motor type	Brake type	Braking torque gradation in Nm ([in-lb])						
DR315	BE120	400 (3540)	600 (5310)	800 (7080)	1000 (8851)			
	BE122			800 (7080)		1200 (10620)	1600 (14160)	2000 (17700)

8.3 Operating currents

8.3.1 Brake BE05/1, BE2, BE5

The current values I_H (holding current) specified in the tables are r.m.s. values. Measure the r.m.s. values using only the appropriate measuring instruments. The inrush current (acceleration current) I_{Acc} only flows for a short time (max. 160 ms) when the brake is released. There is no increased inrush current if a BG or BMS brake rectifier is used or if there is a direct DC voltage supply – only possible with brakes up to size BE2.

	BE05/1	BE2	BE5
Max. braking torque [Nm] ([in lb])	5 (40)/10 (89)	20 (180)	55 (490)
Braking power [W] ([hp])	32 (0.043)	43 (0.058)	49 (0.066)
Inrush current ratio I_{Acc}/I_H	4	4	5.7

Rated voltage V_{Rated}		BE05/1		BE2		BE5
V_{AC}	V_{DC}	I_H [A_{AC}]	I_{DC} [A_{DC}]	I_H [A_{AC}]	I_{DC} [A_{DC}]	I_H [A_{AC}]
24 (23-26)	**10**	2.10	2.80	2.75	3.75	–
60 (57-63)	**24**	0.88	1.17	1.57	1.46	1.25
120 (111-123)	**48**	0.45	0.58	0.59	0.78	0.64
184 (174-193)	**80**	0.29	0.35	0.38	0.47	0.40
208 (194-217)	**90**	0.26	0.31	0.34	0.42	0.36
230 (218-243)	**96**	0.23	0.29	0.30	0.39	0.33
254 (244-273)	**110**	0.20	0.26	0.27	0.34	0.29
290 (274-306)	**125**	0.18	0.26	0.24	0.30	0.26
330 (307-343)	**140**	0.16	0.20	0.21	0.27	0.23
360 (344-379)	**160**	0.14	0.18	0.19	0.24	0.21
400 (380-431)	**180**	0.13	0.16	0.17	0.21	0.18
460 (432-484)	**200**	0.11	0.14	0.15	0.19	0.16
500 (485-542)	**220**	0.10	0.13	0.13	0.17	0.15
575 (543-600)	**250**	0.09	0.11	0.12	0.15	0.13

Key

I_{Acc}	Acceleration current – brief inrush current
I_H	Holding current r.m.s. value in the supply cable to the SEW brake rectifier
I_{DC}	Direct current with direct DC voltage supply
V_{Rated}	Rated voltage (rated voltage range)

8.3.2 Brake BE120, BE122

The current values I_H (holding current) specified in the tables are r.m.s. values. Measure the r.m.s. values using only the appropriate measuring instruments. The inrush current (acceleration current) I_{Acc} only flows for a short time (max. 400 ms) when the brake is released. You may not use a direct voltage supply is not required.

	BE120	BE122
Max. braking torque [Nm] ([in lb])	1000 (8851)	2000 (17700)
Braking power [W] ([hp])	250 (0.335)	250 (0.335)
Inrush current ratio I_{Acc}/I_H	4.9	4.9

Rated voltage V_{Rated}		BE120	BE122
V_{AC}	V_{DC}	I_H [A_{AC}]	I_H [A_{AC}]
230 (218-243)	**–**	1.80	1.80
254 (244-273)	**–**	1.60	1.60
290 (274-306)	**–**	1.43	1.43
360 (344-379)	**–**	1.14	1.14
400 (380-431)	**–**	1.02	1.02
460 (432-484)	**–**	0.91	0.91
500 (485-542)	**–**	0.81	0.81
575 (543-600)	**–**	0.72	0.72

Key

I_{Acc}	Acceleration current – brief inrush current
I_H	Holding current r.m.s. value in the supply cable to the SEW brake rectifier
I_{DC}	Direct current with direct DC voltage supply
V_{Rated}	Rated voltage (rated voltage range)

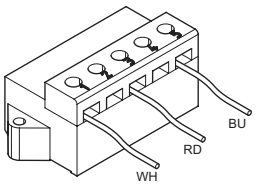
8.4 Resistances

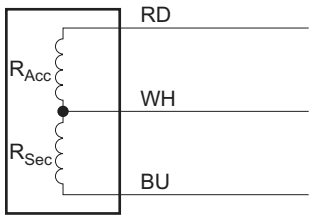
8.4.1 Brake BE05/1, BE2, BE5

	BE05/1	BE2	BE5
Max. braking torque [Nm] ([in lb])	5 (40) /10 (89)	20 (180)	55 (490)
Braking power [W] ([hp])	32 (0.043)	43 (0.058)	49 (0.066)
Inrush current ratio I_{Acc}/I_H	4	4	5.7

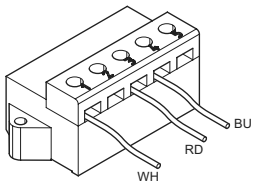
Rated voltage V_{Rated}		BE05/1		BE2		BE5	
V_{AC}	V_{DC}	R_{Acc}	R_{Sec}	R_{Acc}	R_{Sec}	R_{Acc}	R_{Sec}
24 (23-26)	**10**	0.77	2.35	0.57	1.74	–	–
60 (57-63)	**24**	4.85	14.8	3.60	11.0	2.20	10.5
120 (111-123)	**48**	19.4	59.0	14.4	44.0	8.70	42.0
184 (174-193)	**80**	48.5	148	36.0	111	22.0	105
208 (194-217)	**90**	61.0	187	45.5	139	27.5	132
230 (218-243)	**96**	77.0	125	58.0	174	34.5	166
254 (244-273)	**110**	97.0	295	72.0	220	43.5	210
290 (274-306)	**125**	122	370	91	275	55.0	265
330 (307-343)	**140**	154	470	115	350	69.0	330
360 (344-379)	**160**	194	590	144	440	87.0	420
400 (380-431)	**180**	245	740	182	550	110	530
460 (432-484)	**200**	310	940	230	690	138	660
500 (485-542)	**220**	385	1180	290	870	174	830
575 (543-600)	**250**	490	1480	365	1100	220	1050

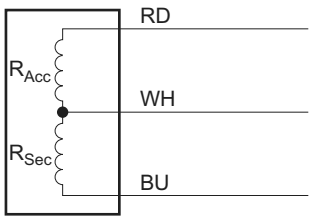
The following illustration shows how to measure resistance with cutoff in the AC circuit.





The following illustration shows how to measure resistance with cutoff in the DC and AC circuits.





BS	Acceleration coil	RD	red
TS	Coil section	WH	white
R_{Acc}	Acceleration coil resistance at 20 °C (68 °F) [Ω]	BU	blue
R_{Sec}	Coil section resistance at 20 °C (68 °F) [Ω]		
V_{Rated}	Rated voltage (rated voltage range)		

NOTE

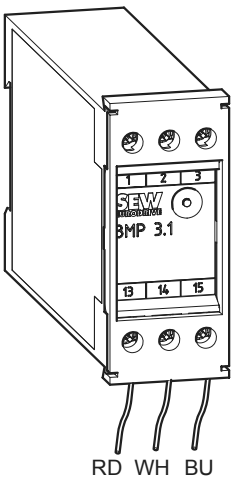
When measuring the resistance of the coil section (R_{Sec}) or the acceleration coil (R_{Acc}), remove the white conductor from the brake rectifier; if it remains connected, the internal resistance of the brake rectifier will cause erroneous results.

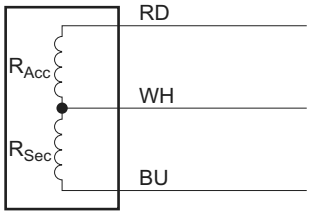
8.4.2 Brake BE120, BE122

	BE120	BE122
Max. braking torque [Nm] ([in lb])	1000 (8851)	2000 (17700)
Braking power [W] ([hp])	250 (0.335)	250 (0.335)
Inrush current ratio I_{Acc}/I_H	4.9	4.9

Rated voltage V_{Rated}		BE120		BE122	
V_{AC}	V_{DC}	R_{Acc}	R_{Sec}	R_{Acc}	R_{Sec}
230 (218-243)	**–**	7.6	29.5	7.6	29.5
254 (244-273)	**–**	9.5	37.0	9.5	37.0
290 (274-306)	**–**	12.0	46.5	12.0	46.5
360 (344-379)	**–**	19.1	74.0	19.1	74.0
400 (380-431)	**–**	24.0	93.0	24.0	93.0
460 (432-484)	**–**	30.0	117.0	30.0	117.0
500 (485-542)	**–**	38.0	147.0	38.0	147.0
575 (543-600)	**–**	48.0	185.0	48.0	185.0

The following illustration shows how to measure resistance with BMP 3.1.





BS Acceleration coil
TS Coil section
R_{Acc} Acceleration coil resistance at 20 °C (68 °F) [Ω]
R_{Sec} Coil section resistance at 20 °C (68 °F) [Ω]
V_{Rated} Rated voltage (rated voltage range)

NOTE

When measuring the resistance of the coil section (R_{Sec}) or the acceleration coil (R_{Acc}), remove the white conductor from the brake rectifier; if it remains connected, the internal resistance of the brake rectifier will cause erroneous results.

8.5 Brake rectifier combinations

8.5.1 Brake BE05/1, BE2, BE5

The table below shows the standard and optional combinations of brakes and brake rectifiers.

		BE05	BE1	BE2	BE5
BG	BG 1.5	X[1]	X[1]	X[1]	–
	BG 3	X[2]	X[2]	X[2]	–
BGE	BGE 1.5	•	•	•	X[1]
	BGE 3	•	•	•	X[2]
BS	BS 24	X	X	X	–
BMS	BMS 1.5	•	•	•	–
	BMS 3	•	•	•	–
BME	BME 1.5	•	•	•	•
	BME 3	•	•	•	•
BMH	BMH 1.5	•	•	•	•
	BMH 3	•	•	•	•
BMK	BMK 1.5	•	•	•	•
	BMK 3	•	•	•	•
BMP	BMP 1.5	•	•	•	•
	BMP 3	•	•	•	•
BMV	BMV 5	•	•	•	•
BSG	BSG	•	•	•	X
BSR	BGE 3 + SR 11	•	•	•	•
	BGE 3 + SR 15	•	•	•	•
	BGE 1.5 + SR 11	•	•	•	•
	BGE 1.5 + SR 15	•	•	•	•
BUR	BGE 3 + UR 11	•	•	•	•
	BGE 1.5 + UR 15	•	•	•	•

X Standard design
X[1] Standard design with brake rated voltage of AC 150 – 500 V
X[2] Standard design with brake rated voltage of AC 24/42 – 150 V
• Optional
– Not permitted

8.5.2 Brake BE120, BE122

The table below shows the standard and optional combinations of brakes and brake rectifiers.

	BE120	BE122
BMP 3.1	X	X

8.6 Brake control

8.6.1 Motor wiring compartment

The following table lists the technical data of brake control systems for installation in the motor wiring compartment and the breakdown in regard to motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

Motor size DR71-100

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BG	One-way rectifier	AC 150...500 V	1.5	BG 1.5	825 384 6	Black
		AC 24...500 V	3.0	BG 3	825 386 2	Brown
BGE	One-way rectifier with electronic switching	AC 150...500 V	1.5	BGE 1.5	825 385 4	Red
		AC 42...150 V	3.0	BGE 3	825 387 0	Blue
BSR	One-way rectifier + current relay for cut-off in the DC circuit	AC 150...500 V	1.0	BGE 1.5 + SR 11	825 385 4 826 761 8	
			1.0	BGE 1.5 + SR 15	825 385 4 826 762 6	
		AC 42...150 V	1.0	BGE 3 + SR11	825 387 0 826 761 8	
			1.0	BGE 3 + SR15	825 387 0 826 762 6	
BUR	One-way rectifier + voltage relay for cut-off in the DC circuit	AC 150...500 V	1.0	BGE 1.5 + UR 15	825 385 4 826 759 6	
		AC 42...150 V	1.0	BGE 3 + UR 11	825 387 0 826 758 8	
BS	Varistor protection circuit	DC 24 V	5.0	BS24	826 763 4	Aqua
BSG	Electronic switching	DC 24 V	5.0	BSG	825 459 1	White

Motor size DR315

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230...575 V	2.8	BMP 3.1	829 507 7	

8.6.2 Control cabinet

The following tables list the technical data of brake control systems for installation in the control cabinet and the breakdown with regard to motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

Motor size DR71-100

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMS	One-way rectifier as with BG	AC 150...500 V	1.5	BMS 1.5	825 802 3	Black
		AC 42...150 V	3.0	BMS 3	825 803 1	Brown
BME	One-way rectifier with electronic switching as with BGE	AC 150...500 V	1.5	BME 1.5	825 722 1	Red
		AC 42...150 V	3.0	BME 3	825 723 X	Blue
BMH	One-way rectifier with electronic switching and heating function	AC 150...500 V	1.5	BMH 1.5	825 818 X	Green
		AC 42...150 V	3	BMH 3	825 819 8	Yellow
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit	AC 150...500 V	1.5	BMP 1.5	825 685 3	White
		AC 42...150 V	3.0	BMP 3	826 566 6	Light blue
BMK	One-way rectifier with electronic switching, 24 V_{DC} control input and separation in the DC circuit	AC 150...500 V	1.5	BMK 1.5	826 463 5	Aqua
		AC 42...150 V	3.0	BMK 3	826 567 4	Bright red
BMV	Brake control unit with electronic switching, 24 V_{DC} control input and fast cut-off	DC 24 V	5.0	BMV 5	1 300 006 3	White

Motor size DR315

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230...575 V	2.8	BMP 3.1	829 507 7	

8.7 Permitted roller bearing types

8.7.1 Roller bearing types for motor size DR71-100

Motor type	A-side (drive) bearing		B-side (non drive) bearing	
	IEC motor	Gearmotor	Three-phase current motor	Brake motor
DR71	6204-2Z-J-C3	6303-2Z-J-C3	6203-2Z-J-C3	6203-2RS-J-C3
DR80	6205-2Z-J-C3	6304-2Z-J-C3	6304-2Z-J-C3	6304-2RS-J-C3
DR90 – DR100	6306-2Z-J-C3		6205-2Z-J-C3	6205-2RS-J-C3

8.7.2 Roller bearing types for motor size DR315

Motor type	A-side (drive) bearing		B-side (non drive) bearing	
	IEC motor	Gearmotor	IEC motor	Gearmotor
DR315K	6319-J-C3	6319-J-C3	6319-J-C3	6319-J-C3
DR315S				
DR315M		6322-J-C3		6322-J-C3
DR315L				

Motor with reinforced bearings

Motor type	A-side (drive) bearing	B-side (non drive) bearing	
		IEC motor	Gearmotor
DR315K	NU319E	6319-J-C3	6319-J-C3
DR315S			
DR315M			6322-J-C3
DR315L			

8.8 Lubricant tables

8.8.1 Lubricant table for roller bearings

Motor size DR71-100

The bearings are 2Z or 2RS closed bearings and cannot be relubricated.

	Ambient temperature	Manufacturer	Type	DIN designation
Motor roller bearings	–20 °C (–4 °F) ... 80 °C (176 °F)	Esso	Polyrex EM[1)]	K2P-20
	+20 °C (68 °F) ... 100 °C (212 °F)	Klüber	Barrierta L55/2[2)]	KX2U
	–40 °C (–40 °F) ... 60 °C (140 °F)	Kyodo Yushi	Multemp SRL[2)]	K2N-40

1) Mineral lubricant (= mineral-based roller bearing grease)

2) Synthetic lubricant (= synthetic-based roller bearing grease)

Motor size DR315

Series DR315 motors may be equipped with a lubrication device.

	Ambient temperature	Manufacturer	Type	DIN designation
Motor roller bearings	–20 °C (–4 °F) ... 80 °C (176 °F)	Esso	Polyrex EM[1)]	K2P-20
	–40 °C (–40 °F) ... 60 °C (140 °F)	SKF	GXN[1)]	K2N-40

1) Mineral lubricant (= mineral-based roller bearing grease)

8.9 Order information for lubricants and anti-corrosion agents

Lubricants and anti-corrosion agents may be obtained directly from SEW-EURODRIVE using the following order numbers.

Use	Manufacturer	Type	Quantity	Order number
Lubricant for roller bearings	Esso	Polyrex EM	400 g (14.1 oz)	09101470
	SKF	GXN	400 g (14.1 oz)	09101276
Type of lubricant Sealing rings	Klüber	Petamo GHY 133	10 g (0.35 oz)	04963458
Anti-corrosive and lubricant	SEW-EURODRIVE	Noco Fluid®	5.5 g (0.19 oz)	09107819

9 Appendix

9.1 Wiring diagrams

	NOTE
	The motor should be connected as shown in the connection wiring diagram or the assignment diagram, which are included with the motor. Only a selection of the common types of connections are shown in the following section. You can obtain the relevant wiring diagrams free of charge from SEW-EURODRIVE.

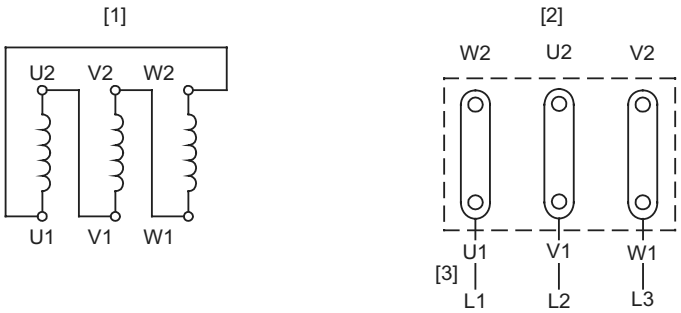
9.1.1 Delta and star connection

Three-phase current motor

For all motors with a rotation speed, direct-on-line or ⅄- △startup.

△ *connection*

The following illustration shows the △connection for lower voltage.

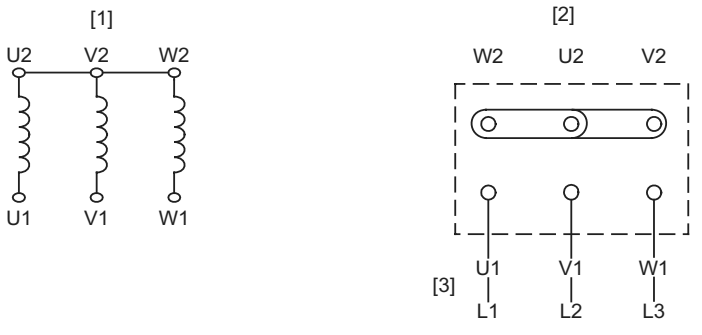


242603147

[1] Motor winding
[2] Motor terminal board
[3] Supply cables

⅄ *connection*

The following illustration shows the ⅄ connection for high voltage.



242598155

[1] Motor winding
[2] Motor terminal board
[3] Supply cables

Change in direction of rotation: Swap connection of 2 supply cables (L1 – L2).

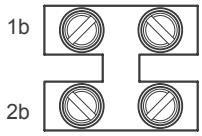
9.1.2 Motor protection using TF or TH with DR71-100

TF/TH

The following illustrations show the connection of the motor protection with TF PTC thermistor sensors or TH bimetallic thermostats.

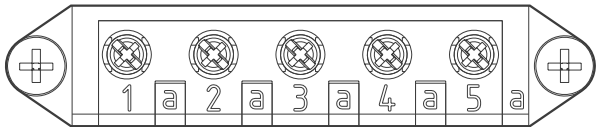
Either a two-pole terminal clip or a five-pole terminal strip is available for connecting to the trip switch.

Example: TF/TH to a two-pole terminal strip.



1b	2b
TF/TH	TF/TH

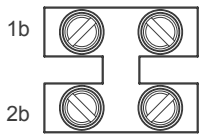
Example: 2xTF/TH to a five-pole terminal strip.



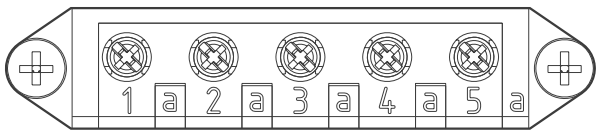
1a	2a	3a	4a	5a
1st TF/TH	1st TF/TH	2nd TF/TH	2nd TF/TH	–

2xTF/TH / with standstill heater

The following illustration shows the connection of the motor protection with 2 TF PTC thermistor sensors or TH bimetallic thermostats and Hx standstill heater.



1b	2b
Hx	Hx



1a	2a	3a	4a	5a
1st TF/TH	1st TF/TH	2nd TF/TH	2nd TF/TH	–

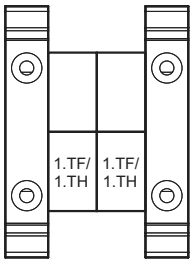
9.1.3 Motor protection using TF or TH with DR315

TF/TH

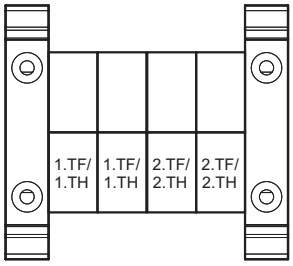
The following illustrations show the connection of the motor protection with TF PTC thermistor sensors or TH bimetallic thermostats.

Depending on the version, an "x-pole" terminal strip is available for connecting to the trip switch.

Example: TF/TH to terminal strip



Example: 2xTF/TH to terminal strip



9.1.4 BGE, BG, BSG, BUR brake control

Brake BE

BGE, BG, BSG, BUR brake control;

Apply voltage to release the brake (see nameplate).

Contact rating of the brake control: AC3 in accordance with EN 60947-4-1.

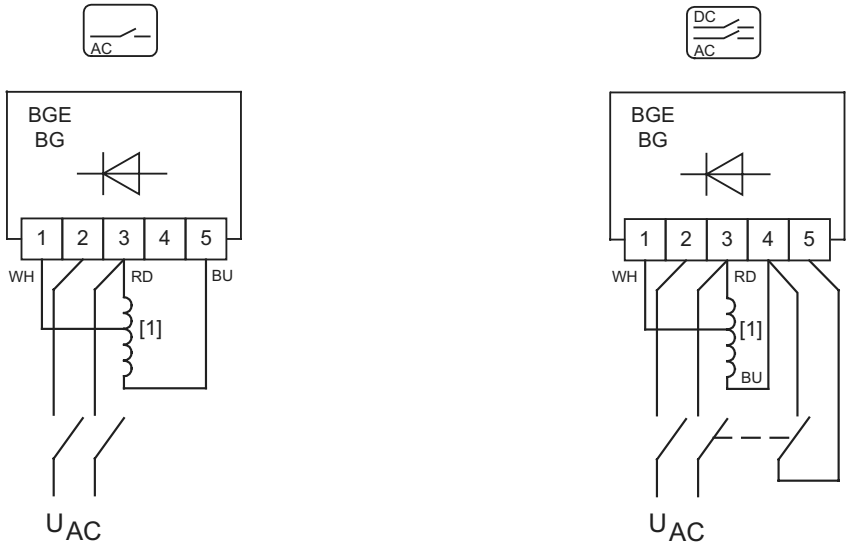
The voltage can be distributed as follows:

- Through a separate supply cable
- From the motor terminal board

This does not apply to multi-speed and frequency-controlled motors.

BG / BGE

The following illustration shows the wiring for BG and BGE brake rectifiers for the AC-side shut-off as well as the DC and AC-side shutoff.

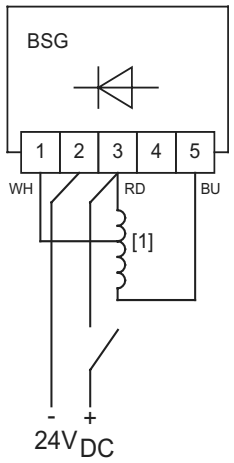


242604811

[1] Brake coil

BSG control unit

The following illustration shows the DC 24 V connection of the BSG control unit



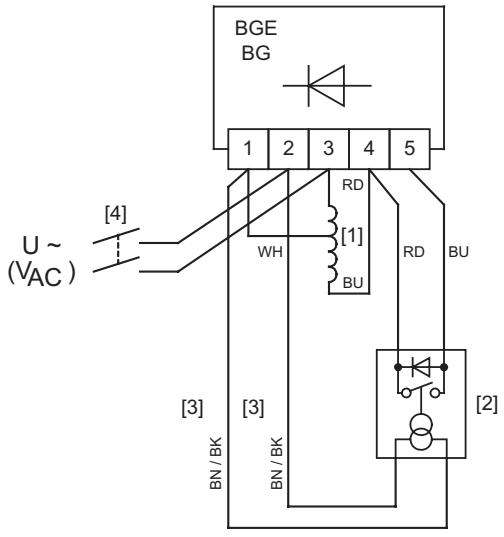
242606475

[1] Brake coil

BUR brake control

STOP	**STOP**
	Connection to motor terminal board not permitted.

The following illustration shows the wiring for the BUR brake control



242608139

[1] Brake coil
[2] UR11/UR15 voltage relay
UR 11 (42 – 150 V) = BN
UR 15 (150 – 500 V) = BK

9.1.5 BSR brake control

BE brake

BSR brake control

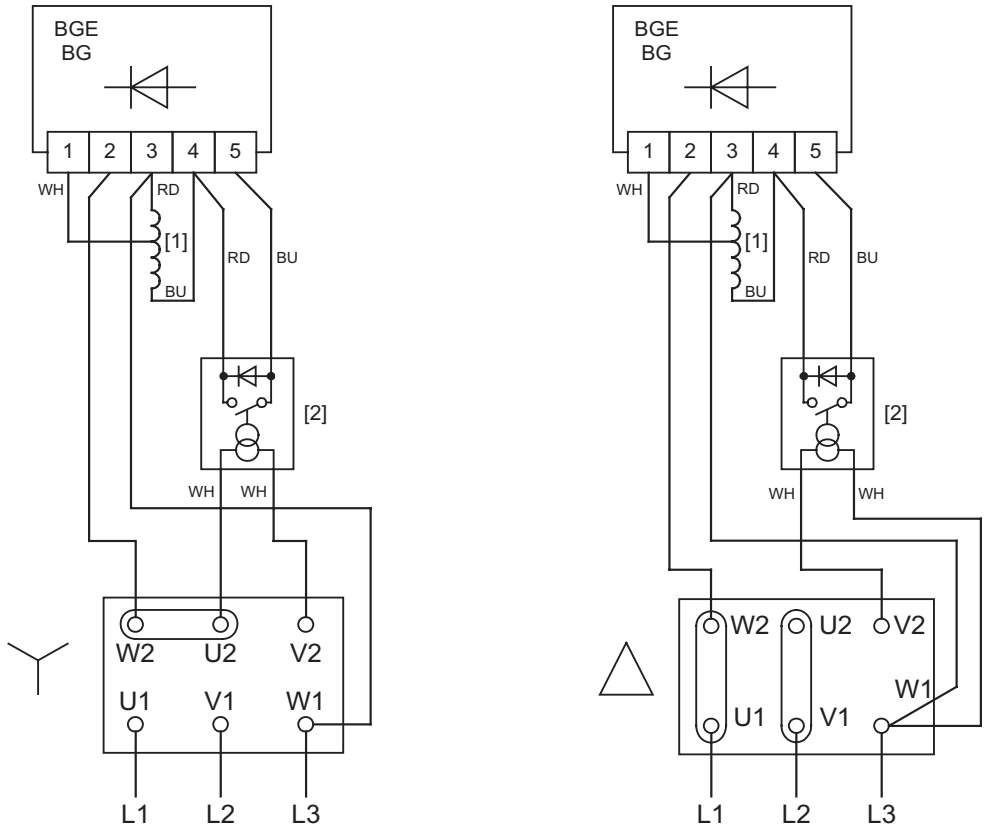
Brake voltage = Phase voltage

The white connecting leads are the ends of a converter loop and, depending on the motor connection, must be connected to the motor terminal block instead of the △ or ⅄ bridge.

Factory: ⅄ The following illustration shows the factory wiring for the BSR brake control

Example: Motor: AC 230/400 V

Brake: AC 230 V



242599819

[1] Brake coil
[2] SR11/15 current relay

9.1.6 BMP3.1 brake control in the terminal box

BE120, BE122 brake

BMP3.1 brake control

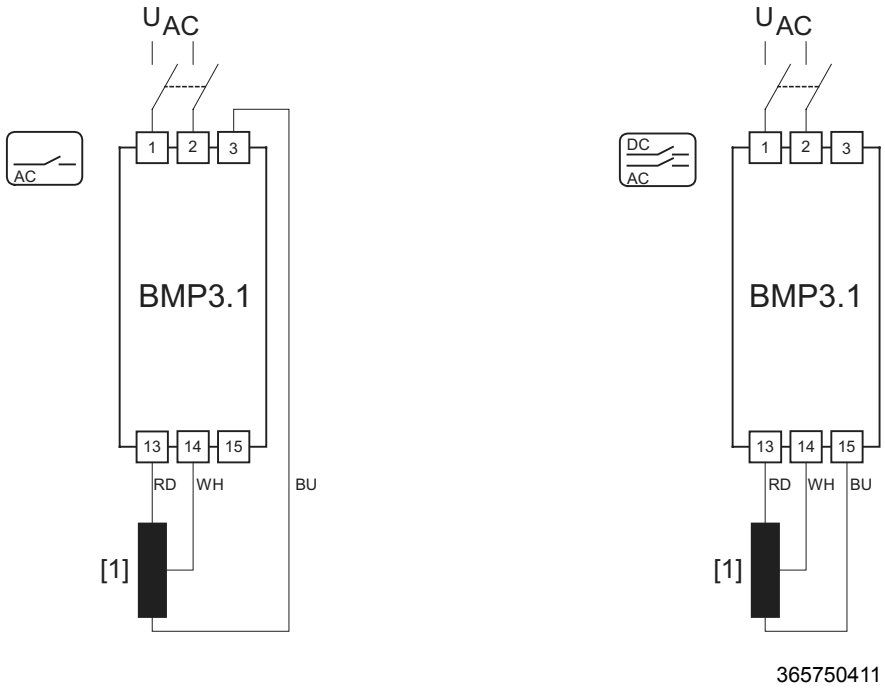
Apply voltage to release the brake (see nameplate).

Contact rating of the brake control: AC3 in accordance with EN 60947-4-1.

Separate supply cables are required for the voltage supply.

BMP3.1

The following illustration shows the wiring for the BMP3.1 brake rectifier for the AC-side shutoff as well as the DC and AC-side shutoff.



[1] Brake coil

10 Malfunctions

10.1 Motor malfunctions

Malfunction	Possible cause	Remedy
Motor does not start up	Break in supply cable	Check the connections and (intermediate) terminal points, correct if necessary
	Brake does not release	See sec. "Brake malfunctions" (page 83)
	Supply cable fuse has blown	Replace fuse
	Motor protection (switch) has triggered	Check that the motor protection (switch) is set correctly; current specification is on the nameplate
	Motor protection does not trip	Check motor protection control
	Malfunction in control or in the control process	Observe the switching sequence; correct if necessary
Motor does not start or starts only with difficulty	Motor power designed for delta connection but connected in star	Correct the connection from star to delta; follow the wiring diagram
	Motor power designed for star-star connection but only connected in star	Correct the connection from star to star-star; follow the wiring diagram
	Voltage or frequency deviate considerably from setpoint, at least while being switched on	Provide better power supply system; reduce the power supply load; Check cross section of supply cable, replace with cable of larger cross section if needed
Motor does not start in star connection, only in delta connection	Torque not sufficient in star connection	If the delta inrush current is not too high (observe the regulations of the power supplier), start up directly in delta; Check the project planning and use a larger motor or special version if necessary (consult with SEW-EURODRIVE)
	Contact fault on star/delta switch	Check the switch, replace if necessary; Check the connections
Incorrect direction of rotation	Motor connected incorrectly	Swap two phases of the motor supply cable
Motor hums and has high current consumption	Brake does not release	See sec. "Brake malfunctions" (page 83)
	Winding defective	Send motor to specialist workshop for repair
	Rotor rubbing	
Fuses blow or motor protection trips immediately	Short circuit in the motor supply cable	Repair short circuit
	Supply cables connected incorrectly	Correct the wiring, observe the wiring diagram
	Short circuit in motor	Send motor to specialist workshop for repair
	Ground fault on motor	
Severe speed loss under load	Motor overload	Measure power, check project planning and use larger motor or reduce load if necessary
	Voltage drops	Check cross section of supply cable, replace with cable of larger cross section if needed

Malfunction	Possible cause	Remedy
Motor heats up excessively (measure temperature)	Overload	Measure power, check project planning and use larger motor or reduce load if necessary
	Insufficient cooling	Provide for cooling air supply or clear cooling air passages, retrofit forced cooling fan if necessary. Check the air filter, clean or replace if necessary
	Ambient temperature is too high	Observe the permitted temperature range, reduce the load if necessary
	Motor in delta connection instead of star connection as provided for	Correct the wiring, observe the wiring diagram
	Loose contact in supply cable (one phase missing)	Tighten loose contact, check connections, observe wiring diagram
	Fuse has blown	Look for and rectify cause (see above); replace fuse
	Supply voltage deviates from the rated motor voltage by more than 5% (range A)/ 10% (range B)	Adjust motor to supply voltage.
	Rated operation type (S1 to S10, DIN 57530) exceeded, e.g. through excessive startup frequency	Adjust rated operation type of motor to required operating conditions; if necessary, call in a specialist to determine correct drive
Excessively loud	Ball bearing compressed, dirty or damaged	Re-align motor and the driven machine, inspect ball bearing (see sec. "Permitted ball bearing types") and replace if necessary
	Vibration of rotating parts	Look for the case, possibly an imbalance; correct the cause, observe method for balancing
	Foreign bodies in cooling air passages	Clean the cooling air passages

10.2 Brake malfunctions

Malfunction	Possible cause	Remedy
Brake does not release	Incorrect voltage on brake control unit	Apply the correct voltage; brake voltage specified on the nameplate
	Brake control unit failed	Install a new brake control, check resistances and insulation of the brake coils (see "Resistances" section for resistance values). Check switchgear, replace if needed
	Max. permitted working air gap exceeded because brake lining worn down	Measure and set working air gap. See the following sections: – "Setting the working air gap for brake BE05-BE5" (page 40) – "Setting the working air gap for brake BE120-BE122" (page 56) If the brake disk is too thin, replace the brake disk (BE05-BE5 < 9 mm / BE120-BE122 < 12 mm). See the following sections: – "Replacing the brake disk for brake BE05-BE5" (page 41) – "Replacing the brake disk for brake BE120-BE122" (page 58)
	Voltage drop on supply cable > 10%	Provide correct connection voltage: brake voltage specifications on the nameplate. Check the cross section of the brake supply cable, increase cross section if necessary
	Inadequate cooling, brake overheats	Provide for cooling air supply or clear cooling air passages, check air filter, clean or replace if necessary. Replace type BG brake rectifier with type BGE
	Brake coil has interturn fault or short circuit to exposed conductive part	Check resistances and insulation of the brake coils (see "Resistances" section for resistance values); Replace complete brake and brake control (specialist workshop), Check switchgear, replace if needed
	Rectifier defective	Replace rectifier and brake coil; it may be more economical to replace the complete brake
Brake does not brake	Working air gap not correct	Measure and set working air gap. See the following sections: – "Setting the working air gap for brake BE05-BE5" (page 40) – "Setting the working air gap for brake BE120-BE122" (page 56) If the brake disk is too thin, replace the brake disk (BE05-BE5 < 9 mm / BE120-BE122 < 12 mm). See the following sections: – "Replacing the brake disk for brake BE05-BE5" (page 41) – "Replacing the brake disk for brake BE120-BE122" (page 58)
	Brake lining worn down.	Replace entire brake disk. See the following sections: – "Replacing the brake disk for brake BE05-BE5" (page 41) – "Replacing the brake disk for brake BE120-BE122" (page 58)
	Incorrect braking torque	Check the project planning and change the braking torque if needed; see section "Work done, working air gap, braking torques" (63) • by changing the type and number of brake springs. See the following sections: – "Changing the braking torque of brake BE05-BE5" (page 43) – "Changing the braking torque of brake BE120-BE122" (page 60) • by selecting a different brake See section "Braking torque breakdown" (page 64)
	Working air gap so large that setting nuts for the manual release come into contact	Set the working air gap. See the following sections: – "Setting the working air gap for brake BE05-BE5" (page 40) – "Setting the working air gap for brake BE120-BE122" (page 56)
	Manual brake release device not set correctly	Set the setting nuts for the manual release correctly See the following sections: – "Changing the braking torque of brake BE05-BE5" (page 43) – "Changing the braking torque of brake BE120-BE122" (page 60)
	Brake locked by manual brake release HF	Loosen the setscrew, remove if needed

Malfunction	Possible cause	Remedy
Brake is applied with time lag	Brake is switched only on AC voltage side	Switch both the DC and AC sides (e.g. through retrofitting the current relay from SR to BSR or the voltage relay from UR to BUR); observe wiring diagram
Noises in vicinity of brake	Gearing wear on the brake disk or the carrier caused by jolting startup	Check the project planning, replace the brake disk if needed See the following sections: – "Replacing the brake disk for brake BE05-BE5" (page 41) – "Replacing the brake disk for brake BE120-BE122" (page 58) Have a specialist workshop replace the carrier
	Pulsating torques due to incorrectly set frequency inverter	Check correct setting of frequency inverter according to its operating instructions, correct if needed

10.3 Malfunctions when operating with a frequency inverter

The symptoms described in section "Motor malfunctions" may also occur when the motor is operated with a frequency inverter. Please refer to the frequency inverter operating instructions for the significance of the problems which occur and to find information about rectifying the problems.

10.4 Customer service

Please have the following information available if you require customer service assistance:
- Nameplate data (complete)
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause

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Service **Competence Center**	**Central** Gear units / Motors	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte-gm@sew-eurodrive.de
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	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

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Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
	Townsville	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@fastbg.net

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 4322-99 Fax +237 4277-03

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.reynolds@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 gm-tianjin@sew-eurodrive.cn http://www.sew-eurodrive.com.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew.com.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 220121234 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30, P.O. Box 100 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Mustamäe tee 24 EE-10620 Tallin	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 sew@sewhk.com

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Assembly **Sales** **Service**	**Baroda**	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi • Baroda - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 http://www.seweurodriveindia.com mdoffice@seweurodriveindia.com
Technical Offices	**Bangalore**	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveinindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 lirazhandasa@barak-online.net

Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 sewjapan@sew-eurodrive.co.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Queretaro**	SEW-EURODRIVE MEXIKO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrail Queretaro C.P. 76220 Queretaro, Mexico	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 richard.miekisiak@premium.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Lodz	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucuresti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia and Montenegro			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 dipar@yubc.net

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybnicna 40 SK-83107 Bratislava	Tel. +421 2 49595201 Fax +421 2 49595200 http://www.sew.sk sew@sew-eurodrive.sk
	Zilina	SEW-Eurodrive SK s.r.o. ul. Vojtecha Spanyola 33 SK-010 01 Zilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-97411 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za dross@sew.co.za
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

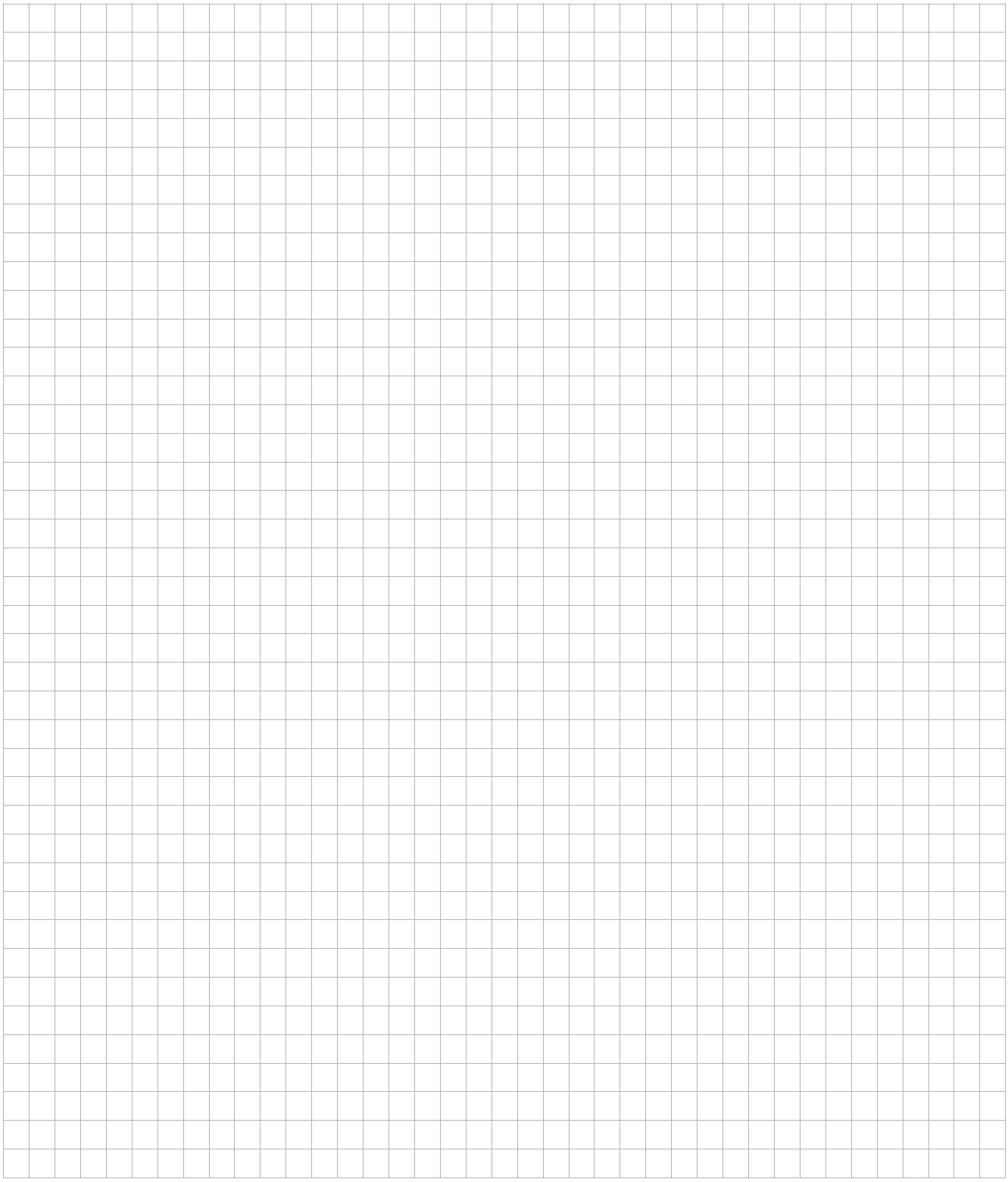
Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn El Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76 tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 164 3838014/15 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve sewventas@cantv.net sewfinanzas@cantv.net



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